POPULAR Computing WEEKLY

35p

29 March-4 April 1984 Vol 3 No 13

BRITAIN'S BEST-SELLING MICRO WEEKLY

STAR
Snakes on Dragon
See page 10
GAME

News Desk

Time lag for lending software

THE increasing number of public libraries lending out commercially produced computer cassette titles is causing concern among software houses

At least six Local Authority libraries are already stocking software and a number of software companies are concerned that program lending represents an open invitation for the borrower to copy their software

A number of companies including CRL and A&F have refused to supply libraries with their programs

Faced with opposition from such companies the Library Association last week held a seminar at which both the local authorities and the micro companies were represented

Peter Marshall, of Bexley Public Library put the case for the libraries while Nick Alexander, chairman of GOSH (Guild of Software Houses) explained the situation from the software manufacturers' point of view Geoff Crabb, from the Council for Education

continued on page 5 ▶

Express software from Japan

Stop the Express — one of three Hudsonsoft/Sinclair programs

NEXT month sees the publication in this country of the first Sinclair Spectrum games written by a Japanese software house

The company — Hudsonsoft — has five titles to be launched in early April, three of which are being released by Sinclair as part of its latest batch of Spectrum programs

The three Sinclair/Hudsonsoft programs are *Eric and the Floaters*, *Stop the Express*, and *Driller Tanks* Hudsonsoft has also reached a licensing agreement with Kuma Computers in Pangbourne who will distribute more of its programs starting with *Vegetable Crash* and *Frog Shooter*

All of the programs are for the 48K machine and feature some novel game concepts Commented Kuma's Tim Moore, "Being Japanese the programs incorporate some different ideas, in contrast to UK programmers who tend to all think along the same lines "

Tokyo-based Hudsonsoft

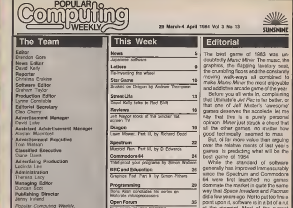
continued on page 5 ▶

This Week

POPULAR Computing WEEKLY

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SUNSHINE



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How to submit articles
Articles which are submitted for publication should not be more than 3 000 words long The articles and any accompanying programs should be original It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work

This Week

Editorial

The best game of 1983 was undoubtedly *Manic Miner* The music, the graphics, the flapping lavatory seat, the crumbling floors and the constantly moving walk-ways all combined to make *Manic Miner* the most enjoyable and addictive arcade game of the year

Before you all write in, complaining that Ultimate's *Jet Pac* is far better, or that one of Jeff Minter's 'awesome' games deserves the accolade let me say that this is a purely personal opinion *Miner* just struck a chord that all the other games no matter how good technically seemed to miss

But, of far more value than arguing over the relative merits of last year's games is predicting what will be the best game of 1984

While the standard of software generally has improved immeasurably since the Spectrum and Commodore 64 were first launched no games dominate the market in quite the same way that *Space Invaders* and *Pacman* did a few years ago Not to put too fine a point upon it, software is in a bit of a rut at the moment Most of the current batch of games have superb graphics, but they all tend to be of the 'blob eat blob' variety

The next generation of game will need to be different in kind as well as in quality Dare one say it — a quantum leap is needed

Next Thursday

Next week's Star Game is Pole Position for the BBC, a fast and hazardous car race Can you complete the last lap without crashing?

AVAILABLE IN APRIL

TWO NEW RELEASES
IT'S THE WOOLUF!
TUBE WAY ARMY



Written by Martin Bulle



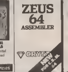
Written by Rainbow Software

From the creators of 'Halls of the Things' 'Invasion of the body snatchas,' and many other software classics come these exciting new games. Games to tax your judgement and puzzle and frustrate you for months on end. Don't forget our other titles which have attracted enthusiastic reviews like "Spectacular, one of the best games I've seen" POPULAR COMPUTING WEEKLY and "Excellent, dangerously addictive, could change the Spectrum games scene overnight" SINCLAIR USER

COMING SOON RETURN OF THE THINGS



HALLS OF THE THINGS
Written by Neil Mottershead, Simon Brattel and Martin Horsley



INVASION OF THE BODY SNATCHAS
Written by Simon Brattel and Neil Mottershead



Written by Graham Stafford



ROMMELS REVENGE
Written by Martin Horsley

THE DUNGEON MASTER
Written by Graham Stafford

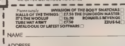
All titles for 48K Spectrum unless otherwise stated

Selected titles available from – John Menzies, Boots, Spectrum, HMV, WOOLWORTH, other large department stores and all good major software retailers. Alternatively, send the coupon to –



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TUBE WAY ARMY	☐	£7.50
INVASION OF THE BODY SNATCHAS	☐	£6.50
THE DUNGEON MASTER	☐	£7.50
ROMMELS REVENGE	☐	£6.50
ZEUS 64	☐	£9.95

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P & P included. Overseas orders, please add £1.50 per item

Libraries

continued from page 1

Technology, also detailed the present laws of copyright in relation to software and the libraries' position

One suggestion to come out of the meeting was that there should be a six-month time lag between the release of a program title and its appearance on the local library's shelves

Japanese games

continued from page 1

was formed 12 years ago and is well known in Japan for its software for the Sharp MZ80K and MZ700 computers The company is reputed to have got its name because its founder is a railway enthusiast and he named the company after the Hudson class of locomotive

Recently, the company has concentrated on Spectrum games and the five programs are the first results of that work

A Sinclair spokesman explained that there was no special relationship between Sinclair and Hudsonsoft "They approached us with their material, some of which we liked very much "

In one of the Sinclair programs — *Stop the Express* — the railway theme is continued The object of the game is to run along the roof of a moving train avoiding flying obstacles.

● At the same time as the Hudsonsoft titles, Sinclair is also announcing two more Spectrum titles — *Buzz Off* and *Zipper Flipper*

QL add-ons

THE number of companies offering peripherals for the Sinclair QL is increasing nearly as fast as the queue of customers still waiting for their machines

The aptly named Miracle Systems in Cambridge claims its Centronics printer interface is compatible with the QL The device plugs into the QL's RS232C port and costs £49

Xcom Services in London is offering a range of 5¼inch disc drives for the QL A dual sided 40 track drive will set you back £351

Yet with no QL's so far sent out, what does one do with all these peripherals?

DIY robot range from Prism

PRISM has announced five new robots — called Movits — at the other end of the price scale from the £1,500 Topo But, the big difference is that you build them yourself

Described by Prism's Director of Developments, Graham Daubney, as 'the modern guy's Lego' the robot kits come complete with all the necessary parts and leads and an instruction leaflet All you need to put them together is a screwdriver, a spanner and the batteries

Prices for the five robots range from £9 99 to £34 99

At the bottom of the range, Monkey 'hangs' from a piece of string along which it can move It is sound sensor controlled — you stop and start it by making a sharp noise — for example by clapping

Piper Mouse, at £19 99, also has a sound sensor but it moves on three wheels on the floor

Line Tracer is £17 99, and runs along a track cable, while Circular is remote controlled by a hand-held radio unit, which can activate its left and right wheels It costs £29 99

The most complex robot of the five is Memocon Crawler, the only one that is truly computer-controlled Memocon has a programmable memory which can retain up to 256 different steps it is activated by a hand held key pad, like Circular It is the most expensive at £34 99

"This is really a 'fun' range of robots," says Graham Daubney, "and a lot of the entertainment and educational value comes from assembling the kit "

Further details from Prism House, 18/29 Mora Street City Road, London EC1V 8BT

CBM comes to Corby

COMMODORE is now well advanced with its plan to establish a major manufacturing facility for its home computers in the UK at Corby in Northamptonshire

When the plant becomes operational in September, European manufacture of home computers will be transferred there from Commodore's West German plant in Braunschweig, which will then concentrate on the production of the company's business computers

The Corby factory aims initially to produce 200,000 Vic 20 and Commodore 64 micros a month — with the capacity to nearly double that rate

By the end of this year, Commodore hopes to be employing 600 people at Corby with that number rising to more than 1 000 over two years

Two thirds of the UK plant's production will be for export, to the rest of Europe, the Middle East and Australia

Commodore emulator

VIDEO Vault has been advertising a software emulator program which is said to allow most Spectrum programs to be run directly on the Commodore 64

The device, offered by mail-order only at £13 50 is claimed to be useable with the majority of Spectrum programs, written either in Basic or machine code

Riad Kaffar a director of Video Vault, explained the working of the cassette program "First you load *New Emulator* into the Commodore 64 and then the Spectrum program — the emulator changes each Spectrum Basic or machine code instruction so that the Commodore machine can understand it The problem presented by the memory taken up by the emulator is got round because, as the Sinclair program is converted, the *New Emulator* begins to disappear, so that when the program is completely loaded there is no emulator left — just a rewritten Spectrum program "

However, Riad does not as yet have a working version of the program — that he expects some time this week — three weeks after the advertisements for the *New Emulator* first appeared

ZX units in shops

SINCLAIR'S ZX Microdrive and Interface I units for the Spectrum are soon to appear in the shops

First deliveries of the peripherals will be made to W H Smiths, Boots, Menzies and other Sinclair outlets during April

The cost of the ZX Microdrive will stay at £49 95 although the special mail-order offer on the Interface I will not apply to retail sales — the price will come up from £29 95 to £49 95 Microdrive cartridges will also be available, priced at £4 95


VALHALLA
SOON FOR COMMODORE 64



Atmos upgrade for Oric owners

BEGINNING next month, Oric will be offering owners of its Oric 1 computer the chance to up-grade their machines to the specifications of the new Oric Atmos machine.

The cost of carrying out the conversion — giving Oric 1 owners the new keyboard and revised 1.1 Rom of the Atmos — has been fixed at £60. This includes a 12-month warranty and new manual.

The service is available for both 16K and 48K Oric 1s, although a 16K Oric 1 will be converted into a 16K Atmos.

In view

VIEWBASE is a new database program for the BBC micro from Silversoft.

The program is capable of being linked to Acornsoft's *View* word processing program, so that files from the database can be read and incorporated into documents being prepared using the word-processor.

Viewbase is available on disc for £24.99 including a comprehensive manual.

Details from Silversoft, London House, 271-273 King Street, London.

Talking the hind leg off a sheep

ORION Data has brought out Micro Command — a hardware add-on that will enable you to do away with both joystick and keyboard.

The package for the Spectrum consists of a speech recognition unit and a microphone. Having 'trained' the Spectrum to recognise your voice and up to 15 different words, such as 'up' 'down' 'left and right', you can then play any game using your speech input to control movement on the screen.

The pack also contains the game *Sheeptalk* to demonstrate the working of the speech input.

Versions for the BBC and Commodore 64 are currently being developed and should be available by August this year.

Microcommand on the Spectrum costs £49.95, but the price for the other computers may vary.

Can you save Betula 5?

PSYTRON is a new game for the 48K Spectrum which will be released in mid April.

The game has six levels — the object being to protect the space colony of Betula 5 from enemy saboteurs. The program features 10 screens of graphics showing the colony.

The game is priced at £7.95 and is supplied complete with a 20-page explanatory booklet. Details from Beyond, Durrant House, 8 Herbal Hill, London.

New generation for Commodore

QUICKSILVA is to convert New Generation's range of Spectrum games for the Commodore 64.

The titles — *3D Tunnel, Knot in 3D, Corridors of Genon and Escape* — will be finished for the Commodore machine by mid-April.

New Generation is also converting its latest Spectrum release *Trashman* for the 64, also scheduled for mid-April.

All the Commodore 64 titles will be distributed and marketed by Quicksilva.

Two machine-code training programs will be the next Spectrum releases from New Generation. These should be finished by the end of April to be followed by versions for the Commodore 64 and BBC machines.

QL—no sign yet

PCW's QL order Week 10: Sinclair confirms it is still on target to deliver the first batch of machines to customers by the end of March. Interest so far gained by Sinclair from our QL order is now around £4.40. With one week to go Sinclair has still not finally decided on the form of the gift to be sent to waiting customers.

Quest II — Fantasia

AFTER the success of *Quest Adventure*, Hewson Consultants has brought out a second adventure game, *Fantasia Diamond*, for the Spectrum 48K.

Written by Kim Topley, who also wrote *Quest Adventure*, this mission involves rescuing not only the priceless Fantasia Diamond itself, but also Boris the Masterspy who has failed in his attempt to recover the gem.

Fantasia Diamond costs £7.95. Details from Hewson Consultants, Hewson House, 56b Milton Trading Estate, Milton, Abingdon, Oxon.

New venture

SIR Clive Sinclair has chosen the Venture Centre in Warwick University's Science Park as the location for his electric car project. Warwick's reputation in electric transport research and development has undoubtedly influenced this decision.

Sir Clive hopes to manufacture a 'family' of electric cars over the next three to five years. The first vehicle, a low cost car for commuter use, should be available by early 1985.

In flight

ACORNSOFT has launched a flight simulation program — Aviator — for the BBC computer.

The program attempts to recreate the experience of flying a Mk II Spitfire. Air Vice-Marshall Sandy Johnstone who commanded 602 Squadron at the Battle of Britain was one of the first to try out the new simulation program. "I'm thrilled with it. If you can learn to manipulate the instruments in Aviator you would be well on the way towards learning to fly."

The program is written by Geoffrey Crammond — who also produced Super Invaders for Acornsoft. It took him eight months to write and features an accurate representation of a Spitfire cockpit. Flying the Acornsoft Spitfire using the keyboard or a joystick, it is possible to loop-the-loop and fly under a bridge to be found in the program.

Aviator costs £14.95 on cassette or £17.95 on disc. Both versions include an instruction manual and a map.

Letters

Decoding on Dragon

I am afraid that Ian Bennett's ingenious encoding program for the Dragon (*PCW* 23-9 February) is another example of the re-invention of the wheel — and a square wheel at that. You will not find the MoD beating a path to your doors for this one.

What he has produced is basically the Gronsfeld cipher of 1655, but with a variation which makes it much more vulnerable. The fact that in each case a fairly short key is used, which is repeated regularly, means that both the Gronsfeld and the Bennett ciphers are most easily attacked by looking for short repeated sections in the cryptogram. Repeated digrams (pairs of characters) are useful, and repeated trigrams are very useful, as they are likely to have come about because a common digram or trigram in the plaintext has been enciphered using the same part of the repeated key.

For example, in the message you published we find the digram 288 766 repeated with an interval of 16, the trigram 160 511 288 at an interval of 48 and 707 202 672 at an interval of 32. This correctly suggests that the numeric key length (twice the length of the key word) is 16, the highest common factor (in the plaintext the trigrams are "f" encoded with key numbers 5,7,9 and "eep" encoded with 7,2,6).

Having determined the key length, we rewrite the cryptogram in as many columns as the keylength. Each column is then encoded using the same part of the key, and we look at the characteristics of each column separately. Mr Bennett has saved us a bit of labour here, as the length of his keyword is 8 so his key number repeats in 16's, and his printing in 16 columns is just right anyway.

Now the Gronfeld and Bennett ciphers part company, and the three hundred year old one is superior, because it adds the key number rather than multiplying by it. In Gronfeld, at this point you have to determine for each column by what constant amount (different for each column) you have to move up or down the alphabet in order to make sense of the letters in each column, in conjunction with its neighbours. There are many possibilities as, for example, moving back up to 9 letters from j gives any letter from a to h. This can be done and there are several techniques to help, but it is time consuming.

Bennett, however, is much easier. Even if you don't realise that the last three characters are zzz, giving 8*122 3*122 and 6*122, you can factorise the numbers in each column, and look for the common factor less than 10 which produces sensible ASCII characters from the other factor for all the numbers in the column.

The whole process of decryptment using pencil and paper only, took me a little less than an hour and that included a false start as I had wrongly thought that a Dragon was upper case only.

In short, if you have any secret deeper and darker than published poetry, don't use this cipher. There are plenty of ways of making very difficult ciphers using microcomputers, but this is not one of them.

J Martin
Maidenhead
Berks

Something old, something new

In the *Peek & Poke* column of *PCW* 16–22 February 1984, Mr Misket asked why "*Old*"-ing a program on the BBC micro alters the number of the first line when it is line number 300 or more. The answer is very simple and is to do with the way in which the BBC stores line numbers in the program.

The second and third byte of each line in memory give the line number high byte than low byte. So line 300 is represented as 01, 2C in hexadecimal. When *Old* is typed the computer changes the first of these bytes in the first line to zero so 01, 2C becomes 00, 2C, ie 44.

Old is related to *New*, which changes this byte to FF in hex and this is the way in which the computer recognises the last line of a program. *New* therefore appears to destroy the program, but apart from the byte in question it is in fact still there and is recoverable by typing *Old*. Pressing *Break* also has the same effect as *New*, so again typing *Old* will recover the program.

The mathematically minded will notice that *Old* changes the first line number by dividing by 256 and taking the remainder, ie 300 changes to 44, 650 to 138, 1000 to 232 etc.

Nigel Martin
University of Durham
Collingwood College
South Road,
Durham DH1 3LT

Cat and mouse

I read with interest the article by John Santi published in *PCW* 23–29 February, concerning the modifying of the *Cat* command so as to render files beginning with *Chr$ (0)* visible again.

I have a tip for those who wish to protect their files from this modified *Cat* and it is based on the fact that control codes can be used in file names. For example, if a file is saved on the Microdrive with file name *Chr$ (0) + "prog"* then the modified *Cat* would produce exactly the same file name as before, which is obviously wrong, and any attempt to *Load* this printed file name will be met with a 'file not found' error.

It is possible to use other control codes such as *Chr$ (13)* which would give the impression that there were two files instead of one, *Chr$ (22)* and *Chr$ (23)* for moving the print position etc.

The article mentioned the fact that most of the routines seem to be relocatable. I was wondering if this includes the *Move* routine and, if so, could this routine be altered so as to make it possible to copy programs directly from one Microdrive to another instead of just data files?

Mark Purcell
University of Nottingham
University Park
Nottingham NG7 2RA

PS Glad to hear you've been awarded 'Magazine of the Year' by the CTA — you deserve it.

"He wants his Oric I bugs back!"

Which software?

I have recently acquired a ZX Interface 2, but have found there is almost no software compatible with it — not only my old programs but some recently purchased ones as well.

Could you advise me what software the ZX Interface can be used with? I am a regular reader of your magazine which I enjoy very much.

Mathew Jones
Foxhill
14 Greenway Road
Galmpton nr Brixham
South Devon

We have noticed very much the same thing. Before the Interface 2 was issued the Kempston format was becoming very much the Spectrum standard. It must be regretted Sinclair did not adopt it. However, future software is very likely to be Interface 2 compatible through sheer economic pressure. It is not difficult for software houses to cater for several different standards and not to do so would be simple carelessness.

Snakes

A new game for Dragon 32 by Andrew Thompson

This program is a version of the game Snake. The player has to control a snake, using the keys *A* for up, *Z* for down, *L* for left and *;* for right. You have to move the snake towards the food, while avoiding the snake's tail and the sides of the screen.

Every time the snake eats some food, it gets longer and the score increases. But the food decays and disappears if the snake cannot get to it in time. When this happens, the snake increases in size but the score stays the same.

When the food decays, a new block of food appears somewhere else on the screen.

If the speed-up *Poke* (*Poke* 65495,0) does not work on your Dragon, then delete line 60.



```
10 '*************
20 '***SNAKES***
30 '****BY*****
40 '**ANDREW***
50 '**THOMPSON**
60 '************
70 CLEAR500
80 POKE65495,0
90 PCLEAR8
100 PMODE4,1
110 PCLS0
120 PMODE4,5
130 PCLS0
140 HS-30
150 N$="THE COMPUTER'
160 E=100
170 LI=3
180 SC=0
190 C=6
200 C1=5
210 CLS0
220 I=5
230 SET(1,0,1)
240 SET(1,1,1)
250 PRINT@I,"SCORE= SC, LIVES= LI
260 POKE1055,143
270 RESET(63,0)
280 RESET(63,1)
290 X=0
300 Y=0
310 A=0
320 B=0
330 S1=1
340 S2=0
350 FORP=1TO62
360 SET(P,3, 1
370 SET(P,30,C)
380 NEXT
390 FORP=3TO30
400 SET(1,P,C)
410 SET(62,P,C)
420 NEXT
430 X=5+RND(44) Y=7+RND(16)
440 A=RND(3)-2
450 B=RND(3)-2
460 IFABS(A)=ABS(B)THEN440
470 GOSUB760
480 A$=INKEY$
490 IFL>6144THENL=6144
500 IFA$="A"THENB=-1 A=0
510 IFA$="Z"THENB=1 A=0
520 IFA$=","THENA=1 B=0
530 IFA$="."THENA=-1 B=0
540 X=X+A Y=Y+B
550 S1=S1+1 S2=S2+1
560 IFS1> THENS1=0
570 IFS2>L THENS2=0
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
320 PRINT@?? YOUR SCORE
330 F[illegible] IF1990
340 PRINT@160 THE HIGH SCORE
350 PRINT@?? [illegible] HELD B[illegible] N$
860 PRINT@480 PRESS THE PA[illegible]
870 FORP=1 8?TO1?
880 NO=PEEK(?)
890 [illegible]
900 POKEP,NO
910 NEXT
920 A$=INKEY$
930 IFA$<> THEN3?2
940 PMODE4,1
950 PCLS0
960 PMODE4,5
970 PCLS0
980 GOTO162
990 PRINT@102, CONGRATULATIONS Y
1000 PRINT@?26, YOUR SCORE [illegible] THE HIGH SCORE
1010 PRINT@290, ENTER YOUR NAME [illegible]RS
1020 PRINT@322,
1030 LINEINPUTN$
1040 IFLEN(N$)>15THENPRINT@386, NO MORE THAN 15 CHARACTERS SOUND1 PRINT@386 PRINT@322,STRING$(LEN(N$),32) GOTO1470
1?50 HS=SC
1060 PRINT@234
1070 PRINT@322
1080 PRINT@386
1090 GOTO840
```

Come the revolution

David Kelly talks to the rebels at Red Shift

Wargaming is a strange art Or is it a science Or a sport?

Whatever it is, the word conjures up a world of small lead soldiers taking regimented steps and firing matchstick cannons across the table-top Red Shift would have you know that that is only one facet of wargaming After all, both *Chess* and *Go* are types of wargame

The history of modern wargaming is a fascinating story in itself Perhaps the first wargame to be given that name was *Kriegspiel* This game was played in Prussia in the early 1800s on a map with pieces to represent the opposing forces and was used as a military tool for training purposes

At the turn of this century H G Wells wrote a book — the wargamer s bible — called *Little Wars* In it he outlined a set of rules and conventions to make a wargame out of matchsticks and toy soldiers

The rules became further formalised after the 2nd World War when Donald Featherstone and others laid down more detailed instructions covering movement of the pieces, what happens when they meet, and a new element, moral — how do the troops react to the outcome of the combat

These three functions are the cornerstone of wargaming and were incorporated into a game called *Tactics 2* manufactuted by Avalon Hill in 1960

At about the same time, the burgeoning hobby split into two opposing camps (as it were) It divided into board gamers and tabletop terrain enthusiasts The board gamers produced games like *Diplomacy* and *Risk*, adding in a political slant and concentrating more on the sophistication of the simulation than the realism of the battle

The figure wargamers got on with checking out the accuracy of the uniforms of their soldiers and researching the strengths of the opposing forces at famous battles in order to try to prove that the good guys would always have won through

Dungeons and Dragons was a specialist off-shoot of the figure wargaming fraternity — Gary Gygax a Californian wargamer, decided that he wanted to try to incorporate character into the way his generals behaved

So how do computers fit in? Wargamers were quick to take advantage of micros as a tool to take the tedium out of the conflicts — churning through the numbers and probabilities to find the outcome of each confrontation *Dungeons and Dragons* enthusiasts also used them for similar applications

Explains Red Shift's Julian Fuller, "Table-top rules are now so detailed that keeping track of all the bits of paper meant that we were spending more time calculating than actually deciding the moves Board wargamers were just as frustrated, because the functions of the mathematics are so complicated that it began to slow down the play

"The humans could no longer easily handle the model they had designed so it seemed logical to implement that maths on a computer it seems better than playing arcade games to me as well

"Companies like Salamander are closer to the *Dungeons and Dragons* end, so they started off producing adventure games

"On the other hand, Red Shift were much closer to the board wargaming side so we started by producing strategy games

"Me and Joe Capricorn met Woof! who was writing for a magazine called *Miniature Wargames* That ended up with us all producing the magazine — as we still do — and out of that also came Red Shift

"We reckoned we could produce reasonable wargames and got stuck in, towards the middle of last year, with our first Spectrum program, *Apocalypse* "



Red Shift rebels (left to right) Woof', Eric the Digit, Dave the Drink, Julian Fuller (alias Dino the Zombie) and the inimitable Joe Capricorn

Apocalypse is a successful board game produced by one of this country's better known independent games companies — Games Workshop Developed by Mike Hayes in the late 1960 s, the game was ideal material for conversion to the computer It is a territorial wargame in which the object is for up to four players to take turns to deploy forces on a board — a map representing Europe

Since its release on the Spectrum late last year Red Shift have followed it with a number of expansion programs designed to use the same core program, yet setting the conflict in another part of the globe or in another time Volume 1 gives a choice of locations — the USA, SE Asia London or Artic Circle, while Volume 2 offers a choice of setting — the Fall of Rome, Napoleon's Campaigns or 1964

At the moment, Red Shift are writing for three machines — the Spectrum, BBC and Commodore 64 Design of each program is a co-operative affair Most of the effort goes into producing a playable game from the original idea "It may take three weeks to go from the idea to a working version on the computer and another three months to hone it till the mechanics of playing it are just right "

The next two games on the BBC machine will be *Islandia* and *English Civil War* *Islandia* is a military economic fantasy game — according to Julian A naval trading game in which a number of players take to the open sea in a variety of craft to seek their fortune from the distant islands and beat off the other players whilst so doing

English Civil War is more of a traditional wargame The opposing forces of two players meet in wooded country and slog it out turn by turn with cavalry, pike, artillery and musket men

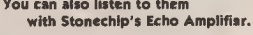
Red Shift s latest release for the 48K Spectrum is *Rebelstar Raiders* Again it is a two-player game — raiders versus operators The object of the exercise is for the raiders to break into and destroy the control room and central computer Main-Comp — shown in plan form on the game display In turn the operators must defend the installation against attack Like *English Civil War* the game has two phases A deployment phase when both opponents select where on the 'board' to place their combatants And a movement phase when the players do battle In *Rebelstar Raiders* each of the warriors has he own skill and endurance ratings — some of the troops perform better than others

The Spectrum version of *Rebelstar Raiders* is already available and a Commodore 64 version is under way Spectrum versions of *Islandia* and *English Civil War* are also on the way

Looking slightly further ahead Red Shift hope to convert another Games Workshop boardgame — *Battlecars* — for the Spectrum, BBC and Commodore

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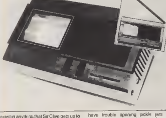

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Clear as crystal

Jeff Naylor *delves inside Sinclair's flat screen tv*

If the casualty departments of hospitals fill up this summer, with people who have walked into lamposts and under the wheels of juggernauts, we will only have Clive Sinclair to blame. The flat screen pocket tv, long since rumoured, has finally crystalized into reality, and is sitting on the corner of my desk.

The FSTV 1 is of interest to home computer users for three reasons: it is technically very impressive, it offers an alternative to liquid crystal displays for portable computers and there is always an interest in anything that Sir Clive gets up to.



Clive Sinclair has become a legend in his own 28 day delivery period. The ZX81 and Spectrum have, I would guess, provided an introduction to micros for the majority of *PCW* readers. His products always have an exciting originality about them, even if, like the Black Watch, they don't always work properly.

The pocket tv is in statutory Sinclair black with red trim, and measures 5½ by 3½ by 1¼. There are two controls - off/on plus volume and tune, accompanied by a small scale. The aerial is retractable and pivots on the top right hand corner, and a leg unclips from the back so you can stand the tv upright.

Before I go any further, let me make it plain that buying a *FSTV* solely for use with a computer is a bit silly, unless you like eyestrain. The screen measures 1½ by 1⅛ inches and to read pages of Ceefax you must get within six inches of it. Don't think that I am precluding the tube as a computer display though. I will expand on the possibilities later.

The obvious technical advance that the tv makes is the shape of the tube, but two other aspects must not be overlooked: the signal processing and the battery. Polaroid have developed, in conjuction with Sinclair, a flat lithium battery measuring 3 by 3⅝ inches and less than an eighth of an inch thick. It fits snugly into a slot in the back of the tv, a little too snugly for pepole who have trouble opening pickle jars. The battery should last 15 hours, and a rough test showed that the *FSTV* drew about 100 mA, giving the battery a capacity of something in the region of 1.5 amp/hours.

At a cost of £9.95 for three batteries viewing works out at 23 pence an hour, which puts the licence fee into perspective! There is a mains adaptor available, but as the strength of the tv is its portability, a rechargeable battery would be better (if technically impossible!).

The feature that will go unnoticed by many is the multi-standard capability. When you go abroad then take your Sinclair with you. But, there are some places that it will not work, notably France, Russia and China.

Not counting the old systems being phased out, such as our 405 line format, television transmissions are either 525 or 625 line standard. The *FSTV* can lock up to either with the aid of a phase locked loop and voltage controlled oscillator.

All systems but one, the French, use what is called 'negative modulation' to transmit their pictures: video that consists of black level, when modulated, creates the largest amplitude radio frequency signal. The idea behind this is that the spikes of radio noise caused by motorbikes charging up and down outside will appear as black spots, which are subjectively less obtrusive. As the *FSTV* decodes negative modulation, the French positive system cannot be received.

The differences in how colour information is transmitted are of no concern on a black and white set, particularly as great care has been taken to ensure that colour signals do not affect monochrome receivers.

The sound reception is where things get a bit tricky. Not only is the spacing between the vision and sound RF different between the two line standards, but the 625 system has further variations. By employing another voltage controlled oscillator and a careful choice of the intermediate decoding frequency, all but the PAL D, K and L standards can be accommodated.

Of course, all this very clever design work is not solely for the sake of our holidays abroad — it means that one design can be sold anywhere. This is important when you realise that almost the whole of the circuitry is contained on a single chip, the development of which must have cost a small fortune. Apart from the UHF tuning stage the board contains the odd driver transistor, a few presets for lining up the picture and a collection of capacitors, resistors and coils. Everything else is inside the Ferranti IC. Its input is RF, while its outputs are audio, video and the line and field signals. It even generates the EHT voltage to drive the tube.

Like all good inventions, the design of the Sinclair flat screen is so obvious it's a wonder that it hasn't been tried before. A conventional cathode ray tube is the shape of a pyramid turned on its side — at the apex is an electron gun which fires a beam at the phosphorus coating on the inside of the base. This means we view the light emissions of the phosphorus from the weakest side.

If electrostatic deflection is used to focus and aim the beam, the pyramid needs to be of a fairly acute angle. The length of oscilloscope tubes bears witness to this. If we resort to electromagnetic deflection we can make the angle more obtuse — 110 degree tubes are not uncommon. The price paid is more powerful deflection signals and greater distortion.

The flat tube consists of a piece of glass shaped somewhat like a bathtub, with a flat plate sealing the top surface. It measures about 4½ by 1¾ by ¾ inches. The right hand end contains the electron gun and

deflection assembly, while the phosphorus screen is on the bottom of the tub at the left (the plughole end?), and is viewed through the top plate We therefore view the phosphorus from the same side as the electrons hit them which results in a very bright picture for a relatively low beam current

This low current coupled with the fairly long beam path allows electrostatic deflection to be used If the beam were aimed directly at the screen it would hit the phosphorus at a very sharp angle The resolution of the picture would be dreadful and distortion problems considerable

As the electrons are fired along the tube parallel to the screen what causes them to bend in order to hit the screen? The underside of the top glass plate that we look through is not all that it seems It is coated with a transparent, conductive material which is negatively charged The phosphorus screen is positively charged to attract the electrons, however and the sum effect on the beam as it leaves the gun is still an attracting force at the other end of the tube

As the beam approaches the screen, the electrostatic field between the top and bottom faces of the tube begin to act, diverting the electrons downwards onto the phosphorus As a suitable analogy we can imagine a fast flowing stream joining another at right angles A canoe floating down the side stream will be swept round into the direction of the main stream — how far across it gets before it is travelling parallel will depend on its original position in the side stream

Of course there are still distortion problems If there were no compensation the picture would diverge considerably towards the far end of the tube and straight lines would appear to curve at the edges of the picture To reduce this, both electronic and optical correction are employed

The electronics affect the scanning signals, cheating them to square up the picture Obviously the picture is less distorted the closer it is to the axis of the electron gun, so the phosphorus patch is not the normal four by three television aspect ratio, but nearer two by one The front half of the tv s case contains a Frenel lens that brings the picture back to normal shape

Incidentally two by one is the Cinemascope aspect ratio If the broadcasters ever forget to unsqueeze a Scope film just take the top off your pocket tv!

So much for the technical miracles How does the pocket tv actually perform?

When the postman delivers one tearing open the box will reveal the telly a carrying pouch earpiece spare battery instructions and order forms The instruction leaflet takes two pages to ensure you get the batteries in the right way two pages on using the tv, one page tells you not to scratch it or drop it in the bath and the last page tells you where you can go on holiday

Having found a battery in place I extended the aerial, held my breath and switched on A clear crisp picture instantly appeared, but within a few moments went off lock. Fiddle with tuning knob Ah, there it is ... no he gone again Fiddle with aerial ... yes — oh no Curse, read instructions fiddle some more try different station, stand on chair No doubt about it It wouldn t stay locked up for more than a few seconds

If it had been my own machine it would have gone straight back but as it had to be back by Friday anyway I took it apart Inside I was presented with eight possible spots to twiddle The first one I tried was the width control The second one needed only a slight twist the picture locked up and hasn t drifted off since It was either bad luck or someone had tweeked it already

If you experience the same problem and are not afraid to void your guarantee its the variable resistor nearest the volume control Be careful, as there are some painfully high voltages inside!

Having got the telly working properly I began some intensive field research Watching *Dallas* on the bus *Minder* in the pub that sort of thing You can see Crystal Palace through the missing slates in my loft, so I would have liked to have tried the television in a fringe reception area In London, it was possible to receive a good picture almost anywhere (except the underground!), with remarkably little ghosting Due to the nature of UHF signals a small aerial movement can cause a vast change in signal level and therefore using the Sinclair on the move, in a car or bus, was rather disturbing

The lens restricts viewing to about 30 degrees though two close friends might use one tv On normal pictures shape distortion is not obvious but if you enjoy watching the test card then prepare for disappointment Horizontal lines near the edges are noticeably curved and the picture is pear shaped near the gun The brightness and contrast are automatic and for most pictures the set up is fine

However, in common with most black and white televisions black level clamping is poor This is most apparent on low key scenes consisting mainly of black with a few brighter patches they are displayed as washed out shades of grey Colour sets need good clamping to retain the colour balance but few black and white sets seem to bother

The sound output from the pocket tv contains rather too much hiss and the small internal speaker does little to help The volume was adequate for most purposes The provision of the earpiece is a good idea as the quality is much better than the speaker and you need not drive the output stage into distortion in order to hear in a noisy environment

After the battery had been used for some time, I began to notice that loud volume settings caused interference on the picture With the sound and video circuits in the same package the current demands of the sound output were causing the picture brightness to vary

If these criticisms seem rather damning, they are not meant to be Considering the technical achievement of cramming a multi-standard flat screen tv into such a small space the results are remarkable

The Sinclair pocket tv has no aerial socket but by hooking a wire to the aerial and tuning to channel 36 you can view the output of your computer You may need strong glasses after a few games of *Manic Miner* though Despite the small size, *Tasword 2* s 64 column screen was almost legible — the tube has good resolution

Remember that computers rarely use the whole tv screen The Spectrum s display must have about 20 percent of wasted space in the border, so winding out the scans on the screen would certainly help There is already a lens in front of the phosphorus patch, and this could probably be increased in strength at the cost of a reduced viewing angle

By taking these factors into account and producing a chip with a video input to drive the flat screen tube Sinclair Research could have a viable display device for a hand-held computer

Whether the flat tube finds its way into computers is a matter for conjecture The pocket tv is definitely here, and working well If the success of the Sony Watchman in America is anything to go by it looks as if Sir Clive will make even more money to spend on his electric car He is likely to get my next spare £80



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Dragon

Cutting the grass

Richard Dodd *puts the finishing touches to his three part Lawn Mower game*

When you have completed the first two stages, the final task is to add the finishing touches. These finishing touches in the *Lawn Mower* game are to be found in program 10

1) **A life lost** — If the lawn mower runs into a wall, or a tree, or runs out of fuel, a life is lost

Line	
650	Plays crash sound
660	Takes one life off
670–690	Updates all the scores
700	Refuel mower
710	Checks to see if you have a life left

2) **The end of the game** — When the lawn mower has lost 3 lives, the game stops and the scores are displayed

Line	
730–750	Prints 'GAME OVER' in the middle of the screen
760–800	Resets all variables for next game
810	PUT's a new screen up
820	Updates the high score if greater than the high score
830	Sets the score to 0

3) **New level** — When a certain amount of the grass has been mown, you go on to the next level with a faster lawn mower to control

Line	
840	Speeds up the lawn mower, adds 1 to the level counter, clears the screen and PUT's up a new screen
850–880	Clears all the obstacles

To finish off the game, enter line 20. By altering this line you can make the game as hard as you wish

20 HI=200 LE=1 P=80 LI=3

HI=The high score to beat

LE=The level you are on

P=Speed (the smaller the value of P the faster you go)

LI=Number of lawn mowers that you have

```
PROGRAM 10

650 PLAY"T5001EEEEEE"
660 0$="" LI=LI-1
670 PR$="    " Q5=5126:GOSUB 1480
680 PR$=STRING$(LI,33) Q5=5127:
     GOSUB 1480
690 PR$=STR$(SC+BN) Q5=5142:
     GOSUB 1480
700 IF F=190 THEN F=25 LINE(230,
     20)-(232,190),PRESET,0F
710 IF LI=0 THEN 730
720 GOTO 480
730 LINE(56,64)-(144,104),PSET,BF
740 LINE(56,64)-(144,104),PRESET,0
750 PR$="GAME OVER":Q5=2568 GOSUB
     1480 EXEC 41194
760 FOR X=0 TO 21
770 FOR Y=0 TO 14
700 P(X,Y)=0
790 NEXT:NEXT
800 0$="" LE=1 LI=3:P=70
     SC=SC+0N:8N=0
010 PCLS 1 PUT(0,0)-(256,191),SR
020 IF SC>NI THEN NI=SC
030 SC=0 GOTO 310
840 P=P-10:LE=LE+1 PCLS 1 PUT(0,0
     )-(256,191),SR SC=SC+BN BN=0
850 FOR X=0 TO 21 FOR Y=0 TO 14
060 P(X,Y)=0
870 NEXT NEXT
060 GOTO 310
```

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The final conflict

D Edwards *concludes his Star Trek program in the last of a three part series*

This week we will start off by examining the function of the machine code in the game There are three small machine code routines — two control graphics and one is responsible for sound effects

This program uses a routine in the Spectrum's Rom located at 949, which produces sound All you need to do is place a number between 0 and 65536 into the DE register pair — this controls the duration — and place a value between 0 and 65536 into the HL register pair which represents the pitch The routine can then be called by *Call 949* from machine code and the values of the HL and DE registers are adjusted and the process is repeated until the B register contains 0 A listing of the program is

```
LD B 8
PUSH BC
LD HL, pitch
LD DE duration
PUSH HL
CALL 949
POP HL
LD DE duration
AND A
ADC HL, DE
LD A,L
CP N
RST56
JRNZ,—30
NOP
LD DE, duration
LD HL, note
CALL 949
LD DE duration
LD HL, 5632
CALL 949
RET
```

The program is located at 65002 and produces a sound not totally unlike that of the Martian s heat ray in George Pal s *War of the Worlds* If the routine at 65030 is called a click is produced which is used in a loop as a separate sound effect

The other two routines store and display a screen full of graphics At the beginning of each game the contents of the display file are stored in another area of memory Whenever you change sector, they are transferred back into the display file The first routine is as follows

```
LD HL, 16384
LD DE, 50000
LD BC 6848
LDIR
RET
```

It uses the machine code instruction *LDIR* to perform a block move operation which transfers an amount of data (the value of which is held in the BC register pair) from the address held in the DE register pair to the address held in the HL register pair The third machine code routine is

```
LD HL,50000
LD DE 16384
LD BC 6848
LDIR
RET
```

This routine transfers the data created by the first graphics routine back into the display file It works in an identical way to the first graphics routine — the number of bytes (the value of which is held in the BC register pair) is transferred back from the address held in the HL register pair to the address held in the DE register pair And so the useful instruction *LDIR* can be summarised by

```
LD HL, from
LD DE, to
LD BC number of bytes
LDIR
RET
```

There are a number of ways to speed up Basic programs to a certain extent and also to make them flicker free The first of these is that all commonly used subroutines should have low line numbers and be as near to the beginning of the program as possible this is because every time you *Gosub* the computer checks every line of your program from the first line until it finds the line you referred to in the *Gosub*

The technique used to achieve flicker free graphics is simple All you have to do is print your object at the desired *X* and *Y* positions Then you must make 'echo copies of these such as

```
LET XI=X:LETY I=Y
```

You can then adjust the values of *X* and *Y* using *Inkeys* etc, and before jumping back to the beginning of the main game loop print at the positions *XI* and *YI* the same characters that were contained in the original print statement except that this time they must be over one This method of programming can be seen in lines 340 to 445 in the game Happy hunting

```
3070 DATA "","  SUDDENLY THE GRAND MUCRON
'S','SHIP APPEARS OUT OF THE VOID.","HE
ATTACKS AND YOU SUFFER",'CONSIDERABLE DA
MAGE.EVIDENTLY',"ALL THE SHIPS IN HIS FL
EET ARE','FITTED WITH A NEW CLOAKING","D
EVICE SO THAT THEY CAN APPEAR","FROM NOW
HERE AND ATTACK YOU.","'," IN THE BATTLE
,THE ENTERPRISE'S ,'DILITHIUM CRYSTAL (T
HE MAIN','POWER SOURCE) IS DESTROYED.THE
','GRAND MUCRON JUMPS INTO ANOTHER","SEC
TOR LEAVING HIS FLEET TO","DESTROY YOU."
,'","    PRESS ENTER TO CONTINUE","    "
3080 DATA "","  ONE SHIP IN THE GRAND MUC
RON'S","FLEET IS CARRYING THE","CHALLENG
ER'S DILITHIUM CRYSTAL.","IF YOU CAN REC
OVER IT YOU WILL",'HAVE ENOUGH ENERGY TO
 USE THE","WARP DRIVE AND RETURN TO',"ST
ARBASE-4.HOWEVER YOU DO NOT","KNOW WHICH
 SHIP IN WHICH SECTOR","HAS THE DILITHIU
M CRYSTAL.",'","  ALL THE SHIPS IN THE GR
AND","MUCRON'S FLEET ARE PILOTED BY","TH
E MUCROIDS HIS MUTANT SLAVES.","","    P
RESS ENTER TO CONTINUE","    ","  THE MUCR
OIDS ARE STUPID,SO","THEIR SIMPLE SHIPBO
ARD COMPUTERS","(MADE BY ACORN) GIVE THE
M A","CHOICE OF TWO BASIC FLIGHT PATHS",
""
3090 DATA "  THE MUCROIDS USE THEIR CLOAK
ING',"DEVICES AND THEN MOVE FROM LEFT","
TO RIGHT OR THE OTHERWAY AROUND.',"WHILS
T MOVING DOWNWARDS FIRING",'AT YOU.","",
"  THE GRAND MUCRON'S SHIP MAY","ATTACK Y
OU CAUSING CONSIDERABLE',"DAMAGE.","","
   PRESS ENTER TO CONTINUE","    ',"","  Y
OU MUST TRAVEL FROM SECTOR TO","SECTOR D
ESTROYING THE MUCROIDS.","WHEN THE MUCRO
ID SHIP CONTAINING","THE CRYSTAL IS THER
E,YOUR",'SOPHISTICATED SHIPBOARD COMPUTE
R","WILL TELL YOU AND YOU MAY","ENERGISE
 THE TRACTOR BEAM.","","    PRESS ENTER
TO CONTINUE",     "
3100 DATA "  YOU START WITH :","","  700 U
NITS OF POWER","  20 UNITS OF TRACTOR BE
AM POWER","     AND',"   0 POWER LOSS.",
"","  YOU MAY JUMP INTO HYPERSPACE","AND
THEN THE MUCROID WILL","REAPPEAR IN A NE
W POSITION.YOU",'MAY USE THE SHIELDS TO
PROTECT',"THE ENTERPRISE FROM SOME DAMAG
E",'",'    PRESS ENTER TO CONTINUE","
","","  THE MUCROIDS DROP CYCLOIDS,",'(A
SORT OF MINE) AND IF YOU',"FIRE YOUR PLA
SMA DISRUPTORS WHEN',"A CYCLOIDS IS IN Y
OUR SIGHTS","THE ENERGY FROM YOUR WEAPON
","WILL BE REFLECTED AND WILL","DAMAGE T
HE ENTERPRISE.",'"
3103 DATA '  THE TRACTOR BEAM WILL ONLY L
AST","FOR A FEW SECONDS.","","  YOU WILL
NOW BE TOLD HOW TO","PILOT THE ENTERPRIS
```

```
E.","","     PRESS ENTER TO CONTINUE","
 "
3105 RESTORE 3040: PRINT  AT 18,0;: FOR
g=1 TO 119: POKE 23692,-1: PRINT : READ
t$: FOR l=1 TO  LEN t$: IF t$(l)=" " THE
N  GO SUB 9800: CLS : PRINT  AT 18,0;: L
ET l=l+1
3109 IF  INKEY$ =" " THEN  GO TO 3115
3110 PRINT  OVER 0;" "; CHR$ 8;t$(l);: N
EXT l: NEXT g
3115 OVER 0: INK 0: CLS : PRINT  AT 1,4;
"MOVEMENT CONTROLS ARE:"; AT 3,4;"Y  U
I  O P"; AT 5,4;"<  J  K  > FIRE"; AT 7,
4;"SHIELD POWER CONTROLS ARE:"; AT 9,4;"
Q  W  S"; AT 11,4;"J  K  ON"
3120 PRINT  AT 13,4;"SECTOR JUMP CONTROL
S ARE:"; AT 15,4;"1 2 3 4 5 6 7 8"; AT 1
7,0;"JUMP INTO THE RESPECTIVE SECTORS";
AT 20,5;"PRESS ENTER TO CONTINUE": FOR p
=0 TO 21: PRINT  AT p,0; OVER 1; INK 7;"
                                ": NEXT p
3125 GO SUB 9800: CLS : PRINT  AT 1,4;"H
YPERSPACE:"; AT 3,4;"PRESS...H"; AT 6,4;
"TRACTOR BEAM:"; AT 5,4;"PRESS...T"; AT
11,2;"WHEN THE CRYSTAL IS PRESENT"; AT 1
3,1;"ENERGISE THE TRACTOR BEAM AND"; AT
15,5;"MOVE THE MUCROID SHIP"; AT 17,8;"I
NTO THE SIGHTS"
3130 FOR f=0 TO 21: PRINT  OVER 1; INK 7
; AT f,0;"
 ": NEXT f: INK 7: PRINT  AT 21,7;"PRESS
 ENTER TO PLAY"
3135 GO SUB 9800: DIM h$(5,3): DIM h(5):
 FOR g=1 TO 5: LET h$(g)="ZBO": LET h(g)
=0: NEXT g
3140 REM SKILL LEVEL
3145 LET s$="ent(er) ski(ll) levul": PAU
SE 50: CLS : FOR g=1 TO 4: FOR i=0 TO 7:
 BEEP .01,1: PRINT  OVER 0; AT 10,7; INK
 i;"ENTER SKILL LEVEL"; AT 13,13;"(1-5)"
: NEXT i
3150 FOR i=0 TO 40
3155 LET i$= INKEY$ : IF i$ >= "1" AND i
$ <= "5" THEN  LET skill= CODE i$-48: GO
 TO 3175
3160 NEXT i: NEXT g: GO TO 7040
3175 PRINT  AT 13,13; OVER 0;"     ": FO
R g=0 TO 5: FOR i=7 TO 0 STEP -1: PRINT
 AT 10,7; PAPER 6; INK i; OVER 0;"  SKI
LL LEVEL:";skill;"   ": NEXT i: NEXT g:
LET skill=skill+2: GO TO 10
7000 REM GIVE SCORE
7005 LET sco= INT (skill*2+(sc+(da/10)+t
/40)): LET t$="YOU SCORED "+ STR$ sco+"
POINTS": IF sc=0 THEN  LET sco=0
7006 LET s$="y(ouu) g(O)t": PAUSE 50
7010 LET t$="YOU SCORED "+ STR$ sco+" PO
INTS": PRINT  AT 9,3;: FOR l=1 TO  LEN t
$: PRINT " "; CHR$ 8; OVER 0;t$(l);: NEX
T l:
7011 LET score=0: FOR g=1 TO 5: IF sco>h
(g) THEN  LET h(g)=sco: LET score=1: GO
TO 7014
7012 NEXT g
7013 DATA "EFFICENCY COMPUTERS SHOW THAT
","YOU HAVE A HIGH SCORE,WHICH IS","WHY
THE GRAND MUCRON SWEARS","TO ATOMISE YOU
.","","","  PLEASE ENTER YOUR INITIALS"
7014 IF  NOT score THEN  FOR p=0 TO 50:
NEXT p: GO TO 3140
7015 LET pcl1=3: LET pcl2=16: FOR p=1 TO
 100: NEXT p: GO SUB 1000
7017 RESTORE 7013: FOR p=3 TO 9: READ t$
: FOR l=1 TO  LEN t$: PRINT  AT p,l;" ";
 CHR$ 8; OVER 0;t$(l): NEXT l: NEXT p
7019 POKE 23658,8: LET n$="": FOR a=1 TO
 3
7020 PAUSE 0: LET a$= INKEY$ : IF a$=""
THEN  GO TO 7020
7025 LET n$=n$+a$: PRINT  OVER 0; AT 14,
14;n$;: BEEP .1,12: NEXT a
7027 LET h$(g)=n$
7030 FOR p=1 TO 100: NEXT p: LET pcl1=3:
 LET pcl2=16: POKE 23658,0: GO SUB 1000
7035 REM HIGH SCORE TABLE
7040 OVER 0: CLS : FOR w=1 TO 4: FOR i=1
 TO 5 STEP .2: PRINT  AT 1,11; INK i;"HI
GH SCORE": NEXT i: NEXT w
7041 LET s$="h(ii)gh sc(or)z": PAUSE 50
7045 FOR w=1 TO 6: PRINT  AT 1+w*3,9;"__
___________": NEXT w
7050 FOR w=1 TO 5: PRINT  INK w+1; AT 3+
w*3,11;h$(w); AT 3+w*3,17;h(w): NEXT w
7055 FOR p=0 TO 50: BEEP .01,p: BEEP .01
,50-p: NEXT p: PAUSE 100
7060 GO TO 3140
9570 REM DRAW TITLES
9571 LET s$="mycroid run": OVER 0:: INK
2: FOR X=30 TO 37:
9575 PLOT X,135: DRAW 0,30: DRAW 10,-10:
 DRAW 10,10: DRAW 0,-30
9580 PLOT X+30,165: DRAW 0,-30: DRAW 20,
0: DRAW 0,30: PLOT X+80,165: DRAW -20,0:
 DRAW 0,-30: DRAW 20,0
9585 PLOT X+90,165: DRAW 20,0: DRAW 0,-1
0: DRAW -10,0: DRAW 10,-20: PLOT X+100,1
55: DRAW -10,0: DRAW 0,10: PLOT X+90,155
: DRAW 0,-20
9590 PLOT X+120,165: DRAW 20,0: DRAW 0,-
30: DRAW -20,0: DRAW 0,30: PLOT X+150,16
5: DRAW 0,-30
9595 PLOT X+160,165: DRAW 25,0: DRAW 0,-
30: DRAW -25,0: DRAW 0,30:
9600 PLOT X+50,120: DRAW 20,0: DRAW 0,-1
0: DRAW -10,0: DRAW 10,-20: PLOT X+60,11
0: DRAW -10,0: DRAW 0,10: PLOT X+50,110:
 DRAW 0,-20
9605 PLOT X+80,120: DRAW 0,-30: DRAW 20,
0: DRAW 0,30
9610 PLOT X+110,90: DRAW 0,30: DRAW 15,-
30: DRAW 0,30
9620 NEXT X: PRINT  AT 13,10; INK 6;"© D
.EDWARDS": FOR I=1 TO 4: FOR F=0 TO 20:
PRINT  AT F,0; OVER 1; INK I;"
                       ": NEXT F: FOR F=0
 TO 20: PRINT  AT F,0; OVER 1; PAPER 7-I;
"                               ": NEXT
F: NEXT I
9625 FOR F=0 TO 20: BEEP .01,F*2: PRINT
 OVER 1; AT F,0; PAPER 0; INK 4;"
                              ": NEXT F
9630 RETURN
9800 IF  INKEY$ <> CHR$ 13 THEN  GO TO
 9800
9810 BORDER 2: BEEP .2,10: BORDER 0: RET
URN
9999 REM ZERO SOLUTION
```

Program protection

Simon Wallace shows how to thief-proof your programs

OK so you've just finished a sure fire best-selling program on your Commodore 64, but you know it won't sell if everyone else can *Load* and *Save* it as easily as you can. Well, a few quick *Pokes* could soon take care of that so read on!

There are many tricks a programmer may use to prevent copying, listing or amendment. Usually there is little work involved in building such locks so firstly, I'll show you a few simple *Pokes* to put at the beginning of a program. The major flaw in this approach is that your changes will only take affect when the program is Run.

The second part of thief-proofing is a way to force a program to Run as soon as it is loaded by means of a Bootstrap. I'll go into more detail later, and then give you some ideas about taking it a stage further.

Vectors

Simple changes are achieved using the Commodore 64's Vector table. A Vector is a pair of bytes which guide the operating system as to which bit of its own code to use for a given command. All you have to do is swap these around a bit and the machine will no longer understand how to *Save* or *List*. However, before you change any value you should *Peek* its normal value and keep a note of it in case you wish to undo your change.

The *List* Vector is the pair of bytes 774 and 775. If this Vector is changed to the error message Vector, a strange error message will occur should anyone attempt to *List* your code. This is achieved with

Poke 774 139 Poke 775,227

Alternatively, you may prefer to merely ignore the command by substituting the Warm Start Vector

Poke 774 131 Poke 775 164

In the same way, you can lock out the *Save* command with

Poke 818 139 Poke 819 227

or

Poke 818 131 Poke 819 164

The unbreakable program

This time we need to be slightly more cunning. First, *Poke* in a tiny machine code routine to simply do nothing at all whenever Basic checks to see if the *Run/Stop* key has been pressed, and then change the Vector to go to your routine. This will make it impossible to *Break* in to the program until the Vector is reset.

Poke 749 169 Poke 750, 1 Rem LDA#1
Poke 751 96 Rem RTS
Poke 809 2. Rem Change Stop Vector
To reset the Vector to its normal value
Poke 802 248

A rather sneaky variant of this idea is to check the *F7* function key instead of the *Run/Stop* key. This way, only you will know to use the *F7* key to *Break*-in to the program.

Poke 749 169 Poke 750 3 Rem LDA #3
Poke 751 197 Poke 752 187 Rem CMP 187
Poke 753,96. Rem RTS
Poke 809 2 Rem Change Stop Vector

A few significant lines of program can be hidden to confuse anyone smart enough to survive the minefield of *Pokes* you have just put in. At the end of a line add the following —Rem "—then sufficient Delete symbols to erase the preceding characters. To get the Delete characters put in end quote marks then backspace. Insert spaces with the Insert Key then use the Delete key (which should look like reversed T's on the screen). Finally, overwrite the end quote marks with a space.

If you wish to prevent any further use of the 64 until it is powered on again simply *Poke 1,52*. Alternatively delete the Basic program from store with

Poke 2049 0 Poke 2050 0 Poke 46,3 Poke 40,8

Bootstrap

A 'Bootstrap' is jargon for a small program which has the sole purpose of loading in the main program required. Basic will do this for you of course, but the program does not start to *Run* immediately unless *Shift* & *Run/Stop* are used to *Load* the program.

The accompanying program will write a Bootstrap program to a) change the warm start Vector to ensure that the bootstrap is run, b) put instructions to *Load* and *Run* into the keyboard buffer so that Basic thinks you have typed "*Run*" and c) pass control back to *Basic*.

Record the Bootstrap routine first on the cassette tape, then *Save* your main program immediately after (if you are a machine code programmer, you could also put *Saved* machine code routines before the main Basic program). Your main program must start with line 0 as follows

0 Poke 45,xxx. Poke 46 yyy Clr

where *xxx* and *yyy* are the values of bytes 45 and 46 in the program immediately prior to *Saving* (nb these values will change when you have typed in line 0 for the first time, so check them again and change the line accordingly).

A really smart thief will realise that your first program is only a Bootstrap, so you could extend its role to also set up some code or values without which the main program will fail. Add further *Pokes* between lines 40 and 100 of the Bootstrap printed in this article to set values in bytes 737 to 767 (nb no other locations can be used in this Bootstrap).

Many people have now obtained *Load*-Save tape copiers which can copy most code routines a piece at a time. These are often defeated by making part of the program depend on reading a data file to be found after the program. It is worth doing this even if it serves no other purpose than to protect the program.

If your entire program is in machine code *Save* your routines then *Save* a simple Basic program to branch to your code

0 SYS xxxx

The Bootstrap will load as many machine code modules as you wish, until a Basic program is loaded, which will overwrite the Bootstrap's *Load* command.

All these tricks are designed to protect your code from unauthorised copying or meddling. No buyer will be over enthusiastic about your attempts to thwart his curiosity, but consider the effect that these techniques will have on the presentation of your program. The user will see the 64 load and run without a sign of Basic. The screen will burst into life with your opening message and (providing your code is error free) the system will run to its conclusion without interruption. The user will then be left with your "goodbye" screen as the computer neatly turns itself off.

```
0 REM BOOTSTRAP WRITER
1 REM THIS PROGRAM WHEN RUN WILL
2 REM SAVE A BOOTSTRAP ON CASSETTE
3 INPUT "PROGRAM NAME = ";F$
4 L=LEN(F$) : POKE 49300,L
5 FOR K=1TOL
6 A=ASC(MID$(F$,K,1)) :
  POKE 49300+K,A
7 NEXT
9 J=679
10 READ I : IF I<0 THEN 25
20 POKE J,I : J=J+1 : GOTO 10
25 J=49152
30 READ I : IF I<0 THEN 40
35 POKE J,I : J=J+1 : GOTO 30
40 REM BOOTSTRAP CODE NOW IN PLACE
```

```
100 POKE 770,167 : POKE 771,2 : SYS 49152
110 PRINT "STOP CASSETTE & BREAKIN TWICE"
120 PRINT "IGNORE ANY FURTHER MESSAGES"
130 GOTO 130
140 REM BOOTSTRAP CODE AT LOCS 679-736
150 DATA 169,47,133,0
160 DATA 169,55,133,1
170 DATA 32,138,255
180 DATA 169,0,141,32,208
190 DATA 169,48,141,119,2
200 DATA 169,76,141,120,2
210 DATA 169,207,141,121,2
220 DATA 169,13,141,122,2
230 DATA 169,82,141,123,2
240 DATA 169,213,141,124,2
250 DATA 169,13,141,125,2
260 DATA 169,7,133,198
270 DATA 108,0,160
299 DATA -1
300 REM M/C CODE TO SAVE BOOTSTRAP
305 DATA 162,1,160,1,169,1
310 DATA 32,186,255
315 DATA 162,149,160,192,173,148,192
320 DATA 32,189,255
330 DATA 169,167,133,251,169,2,133,252
340 DATA 162,5,160,3,169,251
350 DATA 32,216,255
399 DATA 96,-1
```

Taking Pictures

Simon Pithers concludes his two-part graphics art program for the BBC B

This is the second and final part of my Graphics Pad program. First load the section of program which you entered and saved last week. Then enter the second half of the program, save the complete listing and Run.

The program will allow you to create colourful pictures in mode 2 without having to type in masses of instructions. The pictures can then be saved to tape or disc or dumped to a printer.

Notes

PROCbox — This allow the user to draw a full or empty box in any colour

PROCtriangle — This allow the user to draw a full or empty triangle in any colour

PROCvdu — This allow the user carry out most of the VDU command on the BBC

PROCprogramdetails — This lists the general details on the program

PROCend — This carries out the ending routine

PROCprinter — This dumps your picture onto a printer (Epson)

```
2390
2400 DEF PROCbo
2410 PROCclsinfospace
2420 CLS
2430 VDU 28,0,31,19,0
2440 COLOUR2
2450 PRINT TAB(0,26); Enter
2460 PRINT TAB(0,27); the boxes
2470 PRINT TAB(0,28); length by
2480 PRINT TAB(0,29), width
2490 VDU 28,10,31,19,26
2500 CLS
2510 PRINT Length"
2520 INPUT L
2530 CLS
2540 PRINT Width"
2550 INPUT W
2560 CLS
2570 PRINT"Colour
2580 INPUT C
2590 CLS
2600 PRINT" Filled or
2610 PRINT"not Y/N"
2620 INPUT F1$
2630 IF F1$ Y  OR F1$="y  THEN FL=81 ELSE FL=1
2640 CLS
2650 MOVE X%,Y%:MOVE X%,Y%
2660 GCOL 0,C
2670 PLOT FL,L,0
2680 PLOT FL,0,W
2690 PLOT FL,-L,0
2700 PLOT FL,0,-W
2710 PROCclsinfospace
2720 PROCkeywords
2730 ENDPROC
2740
2750
2760 DEF PROCtriangle
2770 PROCclsinfospace
2780 CLS
2790 VDU 28,0,31,19,0
2800 COLOUR2
2810 PRINT TAB(0,26);"Enter the
2820 PRINT TAB(0,27); triangles
2830 PRINT TAB(0,28);"side"
2840 PRINT TAB(0,29);"length "
2850 VDU 28,10,31,19,26
2860 CLS
2870 COLOUR6
2880 PRINT Length"
2890 INPUT
2900 CLS
2910 PRINT Colour
2920 INPUT C
2930 CLS
2940 PRINT Filled or
2950 PRINT"not Y/N
2960 INPUT F1$
2970 IF F1$ [illegible] OR F1$= y  THEN FL=81 ELSE FL=1
2980 CLS
2990 GCOL 0,C
3000 CLS
3010 MOVE X%,Y%:MOVE X%,Y%
3020 PLOT FL,L,0
3030 PLOT FL,[illegible],L
3040 PLOT FL,[illegible]L [illegible]L
3050 CLS
3060 PROCclsinfospace
3070 PROCkeywords
3080 ENDPROC
3090
3100
3110 DEF PROCvdu
3120 PROCclsinfospace
3130 CLS
3140 VDU 28,0,31,19,0
3150 COLOUR3
3160 PRINT TAB(0,26); Enter the"
3170 PRINT TAB(0,27);"VDU no "
3180 PRINT TAB(0,28); and then"
3190 PRINT TAB(0,29); following"
3200 PRINT TAB(0,30), nums (5)
3210 VDU 28,10,31,19,26
3220 CLS
3230 PRINT  Enter VDU
3240 PRINT  number"
3250 INPUT VN
3260 CLS
3270 PRINT Enter the
3280 PRINT Following"
3290 PRINT 5 numbers
3300 INPUT N1,N2,N3,N4,N5
3310 CLS
3320 VDU VN,N1,N2,N3,N4,N5
3330 PROCclsinfospace
3340 PROCkeywords
3350 ENDPROC
3360
3370
3380 DEF PROCprogramdetails
3390 PRINT TAB(7);CHR$141;CHR$134; BBC GRAPHICS PAD"
3400 PRINT TAB(7);CHR$141;CHR$134;"BBC GRAPHICS PAD
3410 PRINT
3420 PRINT" This program is design to allow the"
3430 PRINT" user to create colourful pictures in"
3440 PRINT" Mode 2 without having to type in
3450 PRINT  loads of instructions "
3460 PRINT
3470 PRINT" The main Keywords used in the program"
3480 PRINT" are as follows:-"
3490 PRINT
3500 PRINT" Save   This allows you to save your'
3510 PRINT' picture on tape or disc.
3520 PRINT
3530 PRINT  Load - This allows you to load your"
3540 PRINT  picture back to continue development"
3550 PRINT  or just look at."
3560 PRINT
3570 PRINT' Circle   This allows you to draw a"
3580 PRINT  circle on the screen in any colour
3590 PRINT
3600 PRINT   Please press any key to continue."
3610 A=GET
3620 CLS
3630 PRINT TAB(7);CHR$141;CHR$134; BBC GRAPHICS PAD"
3640 PRINT TAB(7),CHR$141;CHR$134;'BBC GRAPHICS PAD"
3650 PRINT
3660 PRINT" Bo    This allows you to draw a
3670 PRINT" box with any length and width and in
3680 PRINT  any colour on the screen"
3690 PRINT
3700 PRINT" Triangle   This allows you to draw a
3710 PRINT  triangle with any length sides in any"
3720 PRINT  colour on the screen.
```

```
3730 PRINT
3740 PRINT" Vdu - This allows you to do most of'
3750 PRINT" the useful Vdu s.
3760 PRINT
3770 PRINT" Move-cursor - This allows you to move
3780 PRINT" the screen cursor around either with'
3790 PRINT" the pen on or off. The pens colour can"
3800 PRINT" be change by pressing  C  asesll"
3810 PRINT
3820 PRINT " Please press any key to continue"
3830 A=GET
3840 CLS
3850 PRINT TAB(7);CHR$141;CHR$134;"BBC GRAPHICS PAD"
3860 PRINT TAB(7);CHR$141;CHR$134;"BBC GRAPHICS PAD"
3870 PRINT
3880 PRINT" USE THE KEYS BELOW TO MOVE CURSOR:-'
3890 PRINT
3900 PRINT"  Z=Left       X=right "
3910 PRINT"  :=Up         /=Down"
3920 PRINT
3930 PRINT"  S for Stop"
3940 PRINT"  C to Change colour'
3950 PRINT"  1 to turn pen on"
3960 PRINT'  2 to turn pen off'
3970 PRINT
3980 PRINT"  All shapes eg. box,triangles etc may"
3990 PRINT"  be filled in with any colour."
4000 PRINT
4010 PRINT   Also at the end of saving a screen
4020 PRINT"  or when you end the program, you"
4030 PRINT"  will be given a chance to do a screen"
4040 PRINT'  dump to a printer. (Works with most)
4050 PRINT
4060 PRINT ' Please press any key to start
4070 A=GET
4080 CLS
4090 ENDPROC
4100
4110
4120 DEF PROCend
4130 PROCclsinfespace
4140 CLS
4150 PRINT"Do You"
4160 PRINT"want"
4170 PRINT"a Printed"
4180 PRINT"dump to a"
4190 PRINT"printer"
4200 A$=GET$
4210 IF A$="Y" OR A$="y" THEN PROCprinter
4220 VDU 22,2
4230 COL=1
4240 COL1=130
4250 FORX=1TO25
4260   COLOURCOL
4270   COLOURCOL1
4280   PRINT"GOOD BYE. ....."
4290   COL1=COL1+1
4300   IF COL1=136 COL1=128
4310   COL=COL+1
4320   IF COL=8 COL=1
4330   NEXT
4340 END
4350 ENDPROC
4360
4370
4380 DEF PROCprinter
4390 CLS
4400 PRINT"Please turn"
4410 PRINT"on your"
4420 PRINT"printer"
4430 PRINT"and press"
4440 PRINT"return"
4450 INPUT A$
4460 CLS
4470 VDU29,0;0;
4480 VDU2,1,10,1,10,1,10
4490 VDU1,27,1,65,1,8
4500 FORY%=1023TO1500STEP-32:VDU1,27,1,75,1,64,1,1:FORX%=0TO1279STEP4:AX=0
4510     FORBY=0TO31STEP4:AX=AX*2:IFPOINT(X%,Y%-BY)>0 THEN AX=AX+1
4520       NEXT:VDU1,AX:NEXT:VDU1,10:NEXT
4530 VDU1,27,1,50
4540 VDU1,27,1,70
4550 VDU1,12,1,7,3
4560 PROCend
4570 ENDPROC
```



AGF PROGRAMMABLE INTERFACE

Recognised as the only true Hardware Programmed joystick interface this product offers all the features associated with such a design.

You can use *any* Atari-compatible joystick controller with *any* software for your Sinclair Spectrum or ZX81, not just those with a joystick option.

Movement of the joystick is recognised by the computer *exactly* the same as pressing the appropriate control keys and can therefore give the most immediate response to that movement. The hardware programmed design works with *all* possible key-reading methods, both BASIC and Machine Code.

Eight directional movement with or without the fire button being pressed, can be achieved by only programming the left, right, up, down and fire keys required by the game.

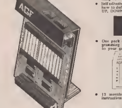
Programming is achieved by a two-digit code, which is looked up on the Programming Chart supplied for each direction and firing button. These two numbers are then selected on a pair of leads which are clipped onto appropriately numbered strips on the interface.

Once configured this can be marked onto a Quick Reference Programming Card for storing with the game. As the programming is not power dependent the interface can be immediately used when next switched on.

The keyboard remains fully functional and can be used simultaneously with the joystick.

An integral rear expansion connector means there is no need to remove the interface to connect other peripherals.

NB. A recent design improvement now means that the AGF Programmable Interface works with the new Quickshot II rapid "Auto Fire" feature.

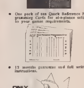


KEY FEATURES

- Programmable design gives TOTAL software support
- Accepts Atari, Competition Pro, Wico Starfighter, Quick Shot, Le Stick etc.
- Rear extension connector for all other add-ons.
- Free demo program and instructions.

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Programming

Jump to it...

Boris Allan *looks at instructions and addresses on the Motorola MC68000 microprocessors in the final part of his series.*

The Zilog Z80 microprocessor (used on the Spectrum) has about 156 different machine code instructions, whereas the MOS Technology MCS6502 has only 52 different instructions. One reason for this disparity is that the Z80 has a much 'messier' instruction set.

The greater the number of the instructions does not necessarily mean the greater the power of the processor. For example, the most powerful of 8-bit chips (the Motorola MC6809) has 71 basic machine code instructions. The MC6809 also has many different adressing modes giving well over 1000 variations.

The Motorola MC68000/68008 (used on the QL and Apple Lisa) has only 56 basic instructions, which is only slightly more than the number for the MCS6502, and about a third as many as the Z80. The MC68000 instruction set is very powerful, and the power comes from simplicity.

has nine, the MC6809 has 11, the MCS6502 has eight and the Z80 has almost six(?)). Note that each of the MC68000 instruction types may have up to 14 manifestations.

An MC68000 instruction occupies from one to five words in memory (a word is two 8-bit bytes) and despite the QL's MC68008 processor only having an 8-bit data bus the instructions are still measured in words.

The first word is the operation-code word (usually termed the 'op-word'), and this contains the binary bit pattern used by the MC68000 to decode the instruction type, operand addressing mode(s), and the length of the instruction (the 'operand is the item upon which the instruction operates).

The additional words (not always necessary) are 'extension words' which can be used for operand addressing modes that use constants (ie 'immediate' values), or absolute addresses...

words, or long words can be copied from any memory location to any other location without affecting any of the registers. Two of the most powerful instructions are *Link* and *Unlink*, which enable the programmer to allocate and deallocate data on the system stack for nested subroutines, linked lists and similar items. *Link* sets the stack pointer to just past the data area with an address pointer to the data area, on *Unlink* the sequence is reversed.

Group two are the integer arithmetic instructions. Included in this group are single and multiple precision arithmetical operations on signed and unsigned numbers. Apart from standard 8-bit operations such as add, subtract, negate, and compare, there are the signed and unsigned divide and multiply operations previously noted.

Group three are the standard logical operations *And*, *Or*, and *Eor* (ie Exclusive *Or*), all of which can operate on bytes, words, or long words (except for two immediate instructions).

Group four contains the shift and rotate instructions, most of which (apart from instructions whose destination are 'memory alterable') can be either byte, word, or



continued from page 29

```
CMP     Compare                                  NOT     One s complement
DBCC    Test condition, decrement, branch        OR      Logical Or
DIVS    Signed divide                            PEA     Push effective address
DIVU    Unsigned divide                          RESET   Reset external devices
EOR     Exclusive Or                             ROL     Rotate left without extend
EXG     Exchange registers                       ROR     Rotate right without extend
EXT     Sign extend                              ROXL    Rotate left with extend
JMP     Jump                                     ROXR    Rotate right with extend
JSR     Jump to subroutine                       RTE     Return from exception
LEA     Load effective address                   RTR     Return from restore
LINK    Link stack                               RTS     Return from subroutine
LSL     Logical shift left                       SBCD    Subtract decimal with extend
LSR     Logical shift right                      SCC     Set conditionas
MOVE    Move                                     STOP    Stop
MOVEM   Move multiple registers                  SUB     Subtract
MOVEP   Move peripheral data                     SWAP    Swap data register halves
MULS    Signed multiply                          TAS     Test and set operand
MULU    Unsigned multiply                        TRAP    Trap
NBCD    Negate decimal with extend               TRAPV   Trap on overflow
NEG     Negate                                   TST     Test
NOP     No operation                             UNLK    Unlink
```



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New-Sinclair QL
There's no comparison chart,

The Sinclair QL is a new computer

Not just a new Sinclair computer, but a totally new sort of computer – nothing like it exists anywhere.

It's not just a bit better than this, or a bit cheaper than that – it's a computer that's very hard to compare with anything. Just check the features below – and if you don't agree take up the challenge at the end of the advertisement.

If you do agree, there's only one course of action you can take get yourself a Sinclair QL at the earliest possible moment.

The Sinclair QL has 128K RAM. Big deal?

Several micros offer 128K RAM, or more as standard. The 'What Micro?' table for December 1983 lists over 50 of them – but 40 of the 50 micros listed cost over £2 500!

The Sinclair QL offers you 128K RAM for under £400, and an option to expand to 640K. That's a lot of bytes to the pound!

The Sinclair QL has a 32-bit processor. Who else?

Under £2 700 nobody. Even the new generation of business computers, such as the IBM PC, are only now beginning to use 16-bit processors.

At prices like this, the Motorola 68000 family – widely regarded as the most powerful microprocessors available – will remain a luxury.

Yet with the Sinclair QL, the 32-bit Motorola 68008 is available for less than £400.

You can also be sure that the QL will not become outdated. 32-bit architecture is future-proof.

32 bit processor architecture, 128K RAM, and QDOS combine to give the QL the performance of a mini-computer for the price of a micro.

Exclusive: new QDOS operating system

No competition! QDOS sets a new standard in operating systems for the 68000 family of processors and may well become the industry standard.

QDOS is a single-user multi-tasking, time-sliced system using Sinclair's new SuperBASIC as a command language.

One of its most significant features is its very powerful multi-tasking capability – the ability to run several programs individually and simultaneously. It can also display the results simultaneously in different portions of the screen. These are features not normally available on computers costing less than £7,000.

Eleven input/output ports

QL ROM Cartridge slot

2 x Joystick ports

2 x RS-232-C

Expansion slot

New professional keyboard

The QL keyboard is designed for fast input of data and programs.

It is a full-size QWERTY keyboard, with 65 keys, including a space bar, left and right hand shift keys, five function keys and four separate cursor-control keys – key action is positive and precise.

A membrane beneath the keyboard protects the machine from dust (and coffee!) and for users who find an angled keyboard more comfortable, the computer can be raised slightly at the back by small detachable feet.

£399, because there's no comparison!

Advanced new friendly language – Sinclair SuperBASIC

The new Sinclair SuperBASIC combines the familiarity of BASIC with a number of major developments which allow the QL's full power to be exploited.

Unlike conventional BASIC, its procedure facility allows code to be written in clearly-defined blocks. Extendability allows new procedures to be added which will work in exactly the same way as the command procedures built into the ROM, and its constant execution speed means that SuperBASIC does not get slower as programs get larger.

2 x Local area network
32-C
TV (UHF)
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QL
Microdrive extension slot

Two 100K microdrives built in

The Microdrives for the Sinclair QL are identical in principle to the popular and proven ZX Microdrives, but give increased capacity (at least 100K bytes each) and a faster data-transfer rate. Typical access speed is 3.5 seconds, and loading is at up to 15K bytes per second. The Sinclair QL has two built-in Microdrives. If required, a further six units can be connected.

Four blank cartridges are supplied with the machine.

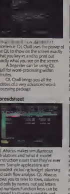


[illegible] Quill, Easel, Archive and Abacus are trade marks of Psion Ltd

Included – superb professional software

The suite of four programs is written by Psion specially for the QL and incorporates many major developments. All programs use full colour, and data is transportable from one to another. (For example, figures can be transferred from spreadsheet to graphics for an instant visual presentation.)

Word-processing

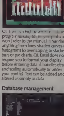


[illegible] excellence. QL Quill uses the power of the QL to show on the screen exactly what you key in, and to print out exactly what you see on the screen.

A beginner can be using QL Quill for word-processing within minutes.

QL Quill brings you all the facilities of a very advanced word-processing package.

Business graphics



QL Easel [illegible] you probably won't refer to the manual. It handles anything from lines, shaded curves or histograms to overlapping or stacked bars or pie charts. QL Easel does not require you to format your display before entering data: it handles design and scaling automatically or under your control. Text can be added and altered as simply as data.

Spreadsheet

QL Abacus makes simultaneous calculations and 'what if' model construction easier than they've ever been. Sample applications are provided, including budget planning and cash flow analysis. QL Abacus allows you to refer to rows, columns and cells by names, not just letters and numbers. Function keys can be assigned to change a variable and carry out a complete 'what if' calculation with a single key stroke.

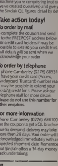
Database management

QL Archive is a very powerful filing system which sets new standards, using a language even simpler than BASIC. It combines ease of use for simple applications – such as card indices – with huge power as a multi-file data processor.

An easy-to-use labelling facility means that you don't have to ask for your file by its full name – a few letters are enough.

New – the Sinclair QLUB

The QLUB is the QL Users Bureau. Membership is open to all QL owners. For an annual subscription of £35 QLUB members receive one free update to each of the four programs supplied with the QL, and six bi-monthly newsletters. Sinclair has also made exclusive arrangements for QLUB members to obtain software assistance on QL Quill, Abacus, Archive or Easel by writing to Psion.



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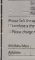
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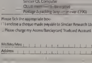
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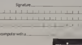
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Open Forum

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published

Rates

on Spectrum

It is interesting to wonder what would be needed to invest as a lump sum in order to pay rates for a set period. This gives some idea of the wealth actually lost by such means. Apart from the Rems, the program given is a bare bones type of program to discover this needing the shortest possible time to type in. (Don't, of course, type in the *Rems!*)

You will need to decide your own figure for the average increase in rates. The interest rate chosen for the investment of the lump sum was 8%, which is roughly what one gets after basic rate tax from a building society. (Building societies do pay tax — it is just that interest rates are always quoted after tax which is not reclaimable by individuals who don't otherwise pay it.) If using an investment where interest is paid without deduction of tax, then don't forget to deduct tax before applying the rate of interest to this program.

Of course, the program can be used for other expenses, such as electricity or telephone bills. This would be useful when considering whether to buy equipment designed to reduce these bills. The analysis of rates in this way is useful when one may be considering moving to a smaller house in order to pay less rates. The costs of moving (£5,000 including VAT for the average move) can then be compared against the saving in rates.

Program notes:

Line 80	Defines the first guess at the capital
Line 90	Defines the other parameters
Line 95	Converts percentages to decimals
Line 96	Stores the capital at start of cycle
Line 100 to 105	Sets up further parameters and header
Line 110 to 150	Works out interest and bills for period
Line 155 to 157	Prints result and decides whether finished
Line 160	Works out new capital to try

```
              Rates 2
       (c) John de Rivaz 1983


  80 LET ca=10000: REM     First
guess at capital to be  invested
to pay  ny  years of rates.
  90 LET inp=8: LET ra=280: LET
rip=17: REM interest  per  cent,
rates (current year),rates incr-
ease  per  cent,  obtained  from
RATES program PCW Vol2 no13.
  95 LET in=inp/100: LET ri=rip/
100
  96 LET cs=ca
 100 LET ny=30: LET y=1983
 105 PRINT "Year";TAB 5;"Capital
";TAB 15;"Interest";TAB 25;"Rate
s"
 110 FOR f=0 TO ny
 120 PRINT y+f;TAB 5;INT ca;TAB
15;INT (ca*in);TAB 25;INT ra
 130 LET ca=ca+ca*in-ra
 140 LET ra=ra*(1+ri)
 150 NEXT f
 155 PRINT "remaining capital ";
ca
 157 IF INT ABS ca=0 THEN  PRINT
 "Starting capital ";INT cs: STO
P
 160 LET ca=cs-ca/11
 970 GO TO 90
```

Rates
by John de Rivaz


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Open Forum

Bitmap

on Commodore 64

This Program is a tool for the Commodore 64 The Program clears the area of memory from 8192 to 16191 This area of memory is used by *Bitmap* mode I first wrote the Program in basic and found it too slow so I rewrote it in machine code When you write a Program in bitmap mode, type my Program at the start and when you want to clear bitmap mode type SYS49152 There are two listings for the Program, the second one shows the Program in machine code

```
PROORAM TO CLEAR BITMAP MODE COMMODORE 64
5 PRINT"MY DAVID SELWOOD"
10 FORA=49152T049104 READB POKEA,B NEXT
100 DATA160,0,169,32,132,251,133,252,169,0,160,0,145,251,
    192,63,200,6,166
110 DATA252,224,63,240,0,200,208,241,230,252,76,12,192,96
ASSEMBLER LIST
1000 *=$C000 ! 49152
1100 LDY #$00 ! LOW CLEAR MAP
1110 LDA #$20 ! NIGN
1120 STY $FB
1130 STA $FC
1140 LDA #$00 ! BYTE IN MODE
1150 LDY #$00
1160 LOOPQ3 STA ($FB),Y
1170 CPY #$3F
1100 BNE LOOPQ1
1190 LDX $FC
1200 CPX #$3F
1210 BEQ LOOPQ2
1220 LOOPQ1 INY
1230 BNE LOOPQ3
1240 INC $FC
1250 JMP LOOPQ3
1260 LOOPQ2 RTS
READY.
```

Bitmap
by David Selwood

Robot

on Spectrum

This is a game for one player, in which the player's 'man' is pursued by evil robots These metallic men will stop at nothing-short of your death Fortunately you can defeat them by luring them onto the deadly anti-matter mines This task is not as easy as it sounds because the mines are also lethal to your touch

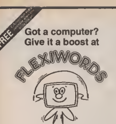
Dangerous yellow mines also appear on the screen, which do not affect the alien hordes, but will destroy you if stepped on Your score, number of men remaining and number of robots still alive this sheet, are all displayed on the screen There can be up to 100 robots on the planet at one time, all of which are deadly to the touch (of course)

If you move into these things you lose a life —
1 A robot
2 Any mine
3 The fence around the perimeter
4 The score
5 The number of robots remaining
6 The number of men

My high score is about 41,000 but this could be beaten with a bit of practice

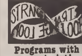
```
   0>BORDER 0. PAPER 0  INK 7  C
LS
   1 REM    R.Holmes 1989 Leeds.
..
   2 FOR j=144 TO 147
   3 FOR k=0 TO 7
   4 READ z. POKE USR (CHR$ j)+k
,z
   5 NEXT k  NEXT j
   6 LET hs=0
   7 DATA 16,88,16,88,84,16,40,4
0,0,0,36,24,24,36,6,0
   8 DATA 42,65,127,73,28,34,34,
99,161,18,64,156,8,68,72,231
   9 CLS
  10 GO SUB 20
  11 GO SUB 3000
  12 GO TO 40
  20 RESTORE 30
  21 FOR i=1 TO 8. READ h,j  BEE
P h,j
  22 NEXT i
  23 FOR k=.1 TO 0 STEP -.01  BE
EP k,88  NEXT k
  24 RETURN
  30 DATA .1,11,.1,11,.8,16,.08,
11,.08,16,.06,11,.66,16,1,20
  31 REM Moon Cresta Music Subro
utine © Ron Smith (PCW) 9/9/82
 100 LET n=2
 110 LET s=0  LET ms=3
 120 GO SUB 500
 130 IF n<100 THEN LET n=n+(11-m
)
 140 DIM a(n)
 150 DIM b(n)
 160 FOR f=1 TO n
 170 LET a(f)=INT (RND*20)+1
 180 LET b(f)=INT (RND*30)+1
 185 BEEP .005,a(f)
 190 IF (a(f)=10 OR a(f)=11 OR a
(f)=12) AND (b(f)=14 OR b(f)=18
OR b(f)=15) THEN GO TO 170
 200 NEXT f
 210 LET x=10  LET y=10
 220 LET d=0
 230 PRINT AT 0,3, INK 5,"Score
"
 231 PRINT AT 21,13, INK 4,"Man
", INK 6,ms
 238 PRINT AT 0,20, INK 6,"Robot
s"
 240 FOR f=1 TO n
 241 IF d=n THEN GO TO 1000
 245 IF a(f)=0 AND b(f)=0 THEN G
O TO 350
 250 PRINT AT a(f),b(f)," "
 260 PRINT AT x,y," "
 265 PRINT AT 0,9, INK 6,s
 266 PRINT AT 0,27, INK 6,n-d,"
"
 270 LET x=x+(INKEY$="v")-(INKEY
$="t")
 280 LET y=y+(INKEY$="g")-(INKEY
$="f")
 290 LET a(f)=a(f)+(a(f)<x)-(a(f
)>x)
 300 LET b(f)=b(f)+(b(f)<y)-(b(f
)>y)
 310 IF ATTR (x,y)=4 THEN GO TO
2000
 311 IF ATTR (x,y)=6 THEN GO TO
2000
 319 IF ATTR (x,y)=0 THEN GO TO
2000
 320 IF ATTR (a(f),b(f))=4 THEN
LET s=s+(10*n)  PRINT AT a(f),b(
f), INK 2,"*"  LET d=d+1  BEEP .
8,-7  BEEP .2,20  PRINT AT a(f),
b(f), INK 4,"x"  BEEP .2,-20  LE
T a(f)=0  LET b(f)=0  GO TO 350
 330 BEEP .01,-10  BEEP .008,-17
 340 FOR u=1 TO 8  PRINT AT x,y,
 INK 6,"$"  PRINT AT a(f),b(f),
```

continued on page 39



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ZEUS 64 ASSEMBLER

CRYSTAL

◀ continued from page 37

```
INK 2,"R"  NEXT u
 300 IF ATTR (x,y)=2 THEN GO TO
2000
 350 NEXT f
 370 GO TO 240
 499 STOP
 500 CLS  INK 4
 510 FOR f=0 TO 31  PRINT AT 0,f
,"/",AT 21,f,"/"  NEXT f
 520 FOR f=0 TO 21  PRINT AT f,0
,"/",AT f,31,"/"  NEXT f
 530 FOR f=1 TO (q*5)  LET f1=IN
T (RND*20)+1. LET f2=INT (RND*30
)+1  PRINT AT f1,f2,"x"  NEXT f
 535 FOR f=1 TO (11-q)*2. LET f1
=INT (RND*20)+1: LET f2=INT (RND
*30)+1. PRINT AT f1,f2, INK 6,"+
"  NEXT f
 540 INK 7: RETURN
1000 CLS  FOR u=7 TO 0 STEP -1
 BEEP .01,(u*7)  BORDER u  NEXT
u  PRINT AT 0,10,"YOU WIN"  PRIN
T AT 10,10,"Score.",s  GO SUB 90
  CLS  GO TO 120
1005 LET n=q
2000 PRINT AT x,y, INK 2,"R"  PA
USE 200  CLS  PRINT AT 10,6,"Yo
u Are Dead!!"
2001 FOR v=10 TO -10 STEP -1  BE
EP .05,v  BEEP .08,v*2  NEXT v
2002 LET as=as-1  IF as=0 THEN G
O TO 2010
2003 INPUT ''''''''''''''''''''"Sta
rt ?"'k$
2004 GO TO 120
2010 CLS  PRINT "All your men a
re now DEAD!!"  PRINT "You Score
d ",s," points"
2011 IF s>hs THEN PRINT "You got
 the highscore"  LET hs=s
2012 IF hs<>s THEN PRINT "You we
re not good enough to get the hi
ghscore"
2013 PRINT  PRINT INK 6, FLASH
1,AT 5,5,"High", FLASH 0," ", FL
ASH 1,hs
2020 INPUT "AGAIN",a$
2030 IF a$="n" THEN STOP
2040 GO TO 9
3000 PRINT "   Robot Chase"
3010 PRINT  PRINT " Oh no not a
nother robot ruled  game?Well ye
s it is.You are the unfortunate
being who is pursuedby the kille
r robots on an alienplanet.Your
only means of escapeis to lure t
he robot hordes intothe lethal a
nti-mat mines."
3020 PRINT  PRINT " But you mus
t not step on these mines yours
elf or you will die."
3030 PRINT  PRINT "GOOD LUCK BR
AVE HUMAN"
3040 PRINT  PRINT " A - You"
3050 PRINT " x - Mine"
3060 PRINT " R - Robot"
3070 PRINT  PRINT "Guiding Robo
ts into mines also  scores points"
3071 PRINT "Use the 'T,F,G,V' ke
ys to move"
3072 PRINT  PRINT "Watch out fo
r dangerous yellow mines "+",wh
ich don't effect   robots."
3080 INPUT "Level 1(hard)-10(eas
y)",q
3090 IF q>10 OR q<1 THEN PRINT
 PRINT 'Are you a dopper or do y
ou just train to be one ?"  GO T
O 3080
3100 CLS  RETURN
```

Robot
by Russell Holmes

Lunar Man

on BBC

You control a Lunar Man who must fly around space collecting satellites but avoiding the space mines. If you take too long to collect a satellite it will move

Program notes

10 — 230	Sets up the screen display
240 — 3380	Main game loop.
370 — 410	User defined graphics.
470 — 580	Mines.
590 — 600	Satellite
610 — 770	Have you hit a satellite?
780 — 810	Prints score at end
890 — 900	Instructions.

```
 10 *KEY 10'OLD!MRUN!M"
 20 ON ERROR RUN
 30 REM BY PHILIP WOODLEY    FEB/84
 40 MODE7
 50 PROCINSTRUCTIONS
 60 IF ADVAL(0) THEN 70 ELSE 60
 70 SC=0
 80 MODE 2:VDU5:LIVES=3:SATELITE=0:PROCVAR:PROCSATELITE:GCOL 0,7:BAT=0
 90 GCOL 0,3:PROCMINES:GCOL 0,7
100 FOR STARS=1 TO 100:Y=RND(1024):X=RND(1280):MOVE X,Y:PLOT 69,X,Y:NEXT
110 MOVE 0,0:DRAW 300,200:PLOT 85,1200.0
120 DRAW 900,200
130 DRAW 1200,0:PLOT 85,300,200
140 GCOL 0,0:PRINTTAB(7,30)"NASA":GCOL 0,1
150 IF ADVAL(0) THEN 160 ELSE 150
160 MOVE 450,200:GCOL 0,0:DRAW 750,200
170 SOUND 1,-10,40,1
180 GCOL 0,7:DRAW 750,300:MOVE 450,200:DRAW 450,300
190 FOR T=1 TO 2000:NEXT T:GCOL 0,0
200 DRAW 450,200:MOVE 750,300:DRAW 750,200
210 GCOL 0,7:DRAW 850,300:MOVE 450,200:DRAW 350,300:SOUND 1,-10,40,1
220 TIME=0
230 X=10:Y=20
240 REPEAT
250 GCOL 0,7:PRINTTAB(X,Y)CHR$226:PRINTTAB(X,Y-1)CHR$225:GCOL 0,0:PRINTTAB(X,Y
)CHR$226:PRINTTAB(X,Y-1)CHR$225
260 A=ADVAL(1) DIV 64
270 B=ADVAL(2) DIV 64
280 IF A<300 X=X+1:IF X>30:X=30
290 IF A>800 X=X-1:IF X<1:X=1
```

continued on page 41 ▶



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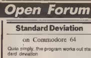
Open Forum

◄continued from page 29

```
  300 IF A>800 Y=Y 1:IF Y 1:Y=1
  310 IF B<300 Y=Y+1:IF Y>25:Y=25
  320 IF X=SX AND Y=SY OR X=SX AND Y-1=SY THEN SATELITE=1:SOUND 1,-15,100,1:SOUN
D 1,-15,120,2
  330 PROCCHECK
  340 IF TIME>600 THEN SOUND 1,-15,10,1:GCOL 0,0:PRINTTAB(SX,SY)CHR$230:GCOL 0,6
:PROCSATELITE:TIME=0
  350 IF LIVES=0 THEN PROCEND
  360 UNTIL SATELITE=1 AND X>5 AND X<15 AND Y>24:SATELITE=0:FOR Q=1 TO 150 STEP
4:SOUND 1,-15,Q,.5:NEXT:GCOL 0,0:PRINTTAB(SX,SY)CHR$230:GCOL 0,4:PROCSATELITE:SC
=SC+10:GOTO 230
  370 DEFPROCVAR
  380 VDU 23,225,28,62,62,28,12,15,255,255
  390 VDU 23,226,15,15,15,28,28,56,56,96
  400 VDU 23,230,0,73,42,28,28,28,42,73
  410 ENDPROC
  420 DEFPROCMINES
  430 PRINTTAB(10,10)"X"
  440PRINTTAB(3,5)"X"
  450PRINTTAB(8,2)"X"
  460PRINTTAB(9,7)"X"
  470PRINTTAB(3,15)'X"
  480PRINTTAB(5,18)"X'
  490PRINTTAB(2,10)"X"
  500PRINTTAB(7,11)"X"
  510PRINTTAB(18,3)"X"
  520PRINTTAB(15,15)"X'
  530PRINTTAB(19,12)"X"
  540PRINTTAB(4,14)"X'
  550PRINTTAB(18,18)"X"
  560PRINTTAB(7,17)"X'
  570PRINTTAB(9,9)"X"
  580 ENDPROC
  590 DEFPROCSATELITE SX=RND(18):SY=RND(15):GCOL 0,6:PRINTTAB(SX,SY)CHR$230
  600 ENDPROC
  610 DEFPROCCHECK
  620 IF X=3 AND Y=5 OR X=3 AND Y-1=5 PROCEXPL
  630IF X=8 AND Y=2 OR X=8 AND Y-1=2 PROCEXPL
  640IF X=9 AND Y=7 OR X=9 AND Y-1=7 PROCEXPL
  650IF X=3 AND Y=15 OR X=3 AND Y-1=15 PROCEXPL
  660IF X=5 AND Y=18 OR X=5 AND Y-1=18 PROCEXPL
  670IF X=2 AND Y=10 OR X=2 AND Y-1=10 PROCEXPL
  680IF X=7 AND Y=11 OR X=7 AND Y-1=11 PROCEXPL
  690IF X=18 AND Y=3 OR X=18 AND Y-1=3 PROCEXPL
  700IF X=15 AND Y=15 OR X=15 AND Y-1=15 PROCEXPL
  710IF X=4 AND Y=14 OR X=4 AND Y-1=14 PROCEXPL
  720IF X=19 AND Y=12 OR X=19 AND Y-1=12 PROCEXPL
  730 IF X=9 AND Y=9 OR X=9 AND Y-1=9 PROCEXPL
  740IF X=7 AND Y=17 OR X=7 AND Y-1=17 PROCEXPL
  750IF X=10 AND Y=10 OR X=10 AND Y-1=10 PROCEXPL
  760IF X=18 AND Y=18 OR X=18 AND Y-1=18 PROCEXPL
  770ENDPROC
  780 DEFPROCEXPL
  790 LIVES=LIVES-1
  800 GCOL 0,1:FOR V=15 TO 1 STEP-1:SOUND0,-V,6,3:NEXT V
  810 FOR T=1 TO 2000:NEXT:GOTO 230
  820 DEFPROCEND:CLS
  830 GCOL 0,2:PRINTTAB(3,10)"YOU SCORED ";SC
  840 IF ADVAL(0) RUN ELSE 840
  850 ENDPROC
  860 DEFPROCINSTRUCTIONS
  870 PRINTTAB(10,2)CHR$141CHR$131"LUNAR MAN":PRINTTAB(10,3)CHR$141CHR$131'LUNAR
MAN"
  880 PRINT  "    You must control LUNAR MAN using    a joystick and fetch the
blue satalite  back to your shuttle while avoiding the yellow mines.Press the fi
re button to   open the shuttle bay doors."
  900 ENDPROC
```

Lunar Man
by Philip Woodley

Open Forum



Standard Deviation

on Commodore 64

Quite simply, the program works out standard deviation

Program notes

1–2	Clear screen, turn on sound and dimension arrays.
3–45	Input numbers.
50	Work out mean
60–90	Calculthe
100–140	Calculate standard deviation and display the answer
150–160	Return to beginning when a key is depressed.
200–270	Programming instructions The program is listed on the 1520 printer plotter which cannot handle the usual control characters.

Variables

NO	Total number of numbers.
S(I)	Array to hold numbers.
T	The total of all the numbers added together
M	The mean of the numbers.
ED	Holds the value for the top half of the standard deviation equation
D(I)	is the mean minus a number
SD	Is the standard deviation — i.e. the answer

```
0 REM STANDARD DEVIATION BY SARAH COTTON
1 DIMS(50):DIMD(50):POKE36870,15
2 PRINT "":POKE36879,27
3 PRINT "SQQQQQQQQQQQ]]STANDARD DEVIATION
"
4 FORTT=1TO1500:NEXTTT
10 PRINT"QQQQQQQTOTAL NUMBER OF NO'S"
11 PRINT"QTO BE ANALYSED.
12 INPUT"QQ";NO:IFNO>50 THEN10
13 PRINT"
14 PRINT QQQQQQQQQ  PLEASE INPUT NO'S"
15 FORTT=1TO1500:NEXT
20 FORI=1TONO
30 INPUT "QQQQQQQQQQQQ]]]]]]]";S(I)
31 POKE36878,200
35 T=T+S(I)
36 POKE36876,0
40 NEXT
45 PRINT"QQQQQQQQQQQQ]]]]THANK YOU."
46 FORTT=1TO1000:NEXT
50 M=T/NO
60 FORI=1TONO
70 D(I)=M-S(I)
80 ED=ED+(D(I))↑2
90 NEXT
100 SD=(ED/NO)↑0.5
110 PRINT"QQQQQQQQQSTANDARD DEVIATION
IS:
120 PRINT" ]]]]]]+"SD
130 PRINT"]]]]]]-"SD
140 PRINT QQQQQ]]]]HIT ANY KEY"
150 GETA$:IFA$=""THEN150
160 GOTO10
200 REM PROGRAMMING INSTRUCTIONS
(NO NEED TO TYPE THESE IN).
210 REM "" =CLR
220 REM "S" =HOME
230 REM "Q" =CRSR DOWN
240 REM "]" =CRSR RIGHT
250 REM "" =BLACK
260 REM "" =PURPLE
270 REM "" =RED

READY.
```

Standard Deviation
by Sarah Cotton

Microradio

GW6JJN

Futurology

This week I thought we'd swap the technology for a bit of futurology

Each time I go on the air the conversation inevitably turns to computers and it seems to take two distinctive directions The first is the person who, like me is excited about the possibilities of computers in radio and the prospect of reliable digital communications around the world The second is the old argument about what is the point of it all, we'll end up with computers talking to computers and we humans will be left in the cold I cannot help thinking that this is the ostrich-eye view of technology

The odd thing is that people with this latter point of view have often recently bought the latest all-singing, all-dancing Japanese transmitter with bells on When I mention the fact that their transceiver is run by a microprocessor and that the majority of its circuits are digital I am faced with disbelief

Digital technology in radio is now a fact of life Without it there would be hardly any repeaters and no satellites Radios that today cost a few hundred pounds and consist of scanning circuits, digital displays, etc, were undreamed of just a few years ago Already the new technology has brought tremendous benefits

Many people write to me about the implementation of Morse code or RTTY on their computer, and this is a good use of the machine, but it is not the best use Radio Hams have always been in the forefront of communications technology — in fact, amateur radio is responsible for many of the things that are now taken for granted yet to many, now it has all been done There are no new countries to contact, nothing new under the sun

I feel very strongly that we are now at a beginning not an end Cheap digital technology has given us the means to experiment A home computer is a very powerful tool and all that is need is the imagination to utilise it

A few weeks ago I wrote about packet radio (and I shall do so again) in which digital instead of analogue signals were transmitted This kind of advance fills me with enthusiasm Think of what can be encoded in a digital form Graphics, television pictures, games and audio to name but four Look in your local record shop, you will see long play records marked 'Digital Recording' The sound they produce is more accurate than analogue If Beethoven can be encoded in binary and come out just as it went in then the mind boggles

Using satellites and/or microwave repeaters we could send both audio and pictorial information suitably encoded wherever we wish Ever fancied playing chess in real time with a Russian, Backgammon with a Greek or Blackjack with an amateur in Las Vegas? Anything is possible The technology is here All that is required is all that has ever been required — the vision to see beyond the technology and the determination to make a dream come true.

Ray Berry GW6JJN

Peek & Poke



EIGHT WAY MOVEMENT

Raymond Elliot of Corslet Crescent, Currie, Midlothian writes

Q Could you tell me if the Triga command Joystick has eight directional movement and whether I could use it in conjunction with the Stonechip programmable interface. If it does not could you suggest a joystick which is?

A Both use the common Atari type interface, and so yes they are compatible with each other.

AFTER YOU CESIL

Mr D Capstick of Barton Park, Seely Oak, writes

Q I buy several computer magazines fairly regularly, and PCWk every week. Over the last half year or so I have noticed increasing references to a computer language, *Cesil*. Yet although it has been referred to in passing, and treated knowingly by the magazines, I have never seen an explanation of what it is or what it does. Can you help?

A I must admit that I have never dealt with *Cesil*, and do not know anyone who has, despite knowing several school teachers. Like every other word in the computer world *Cesil* is an acronym, in this case standing for 'Computer Education In Schools Instruction Language'.

As far as I know, and no doubt someone will write and tell me if I'm wrong, there are no *Cesil* compilers for the common home micros, its use being mainly on mini computers, some of which have been in the more forward schools for quite a while. The aim of the language, is to help pupils to get to grips with lower level programming techniques.

INVERSE VIDEO

N Stacey of Regent Street, Sutton in Ash, Notts. writes

Q Some programs I would like to put into my Spectrum contain lines which have words or letters printed inside black blocks. Could you tell me how to achieve such lines. One program that uses them is Aliens (*PCW*, 19-25 January 1984).

A The two commands you need to use are the *True video* which is Shift/3, and *INVerse Video* which is Shift/4. What these commands do is place a token in the screen memory to tell the computer to reverse its video output. This will remain in effect until the command is changed. So if you want a line printed Inverse then after you have opened your inversed commas press Shift and 4 at the same time. You will see no change until you enter your next character, which will be inverted. Everything you do from now on will remain inverted until you enter *True video* (Shift and 5). Using this technique it is quite possible to change parts of a single program line. I have seen it used once on all command words.

REFRESHING SPECTRUM

Bob Pearson of Bronwen Court, London, NW8 writes

Q Your page, (Issue Oct 27 to Nov 2) is the second statement I have seen saying that the Spectrum spends a lot of time refreshing memory.

As I understand it, refreshing is done during the fetch stage of every instruction execution, and thus consumes no useful time at all. Refreshing is not done during the interrupt keyboard scan and keyboards update.

Poor maligned Spectrum, in machine code it is so good and so fast, that the system is used in computers costing over £6000! Nearly a million adds a second isn't bad. By the way, I'm interested to know how the Z80a compares with the IBM 360/30. I started on nearly fifteen years ago, any ideas?

A You're right and wrong. Refreshing is done after any memory operation. A lot of the time the chip is working is spent dealing with the refresh cycle. However in effect you are right. Any computer using dynamic Ram has the same problem. A 6502 based system, is no better off. The 6502 needs an extra chip to refesh the Ram, yet when this is being done the Ram is inaccessible to CPU. So regardless of the computer there is a lot of time when the CPU of whatever type, cannot access the RAM.

As you say, the Z80 is a very fast chip, usually running faster than 6502s, it has the further advantage that an extra chip is not needed to implement the refresh cycle. Only when static Ram, which does not need refreshing is used do real advantages in this area become apparent, and like anything else these are off-set by other factors.

As for a comparison with the IBM. It is a compliment that the Spectrum should ever be mentioned in the same context as one of its bigger brothers. As I do not know the computer I really cannot say anything about how they compare. Any readers got any ideas on this?

SECOND LANGUAGE

Paul Thompson of Garfield Walk, Croydon writes

Q I know that Jupiter have been liquidated, and I was, like many other people, considering the advantages of the ACE to learn a second language, ie Forth. I am sure that I read somewhere that ACEs were still available at a reduced price. Is this true? If so could you give me details. Failing this do you know of a Forth package for my Commodore 64?

A The remaining ACE stocks have been taken over by Boldfield Ltd who can be contacted at Sussex House, Hobson Street, Cambridge. The price is £29.95+3.45 P&P. The Ram pack (16K) is another £23. If you are serious about learning Forth this might well be the best way to go about it. Despite its failure in the market place the ACE is an excellent little computer. To date I do not know of a Forth package for the Commodore 64 though I would now expect to see one sooner rather than later.

WARHING CARTRIDGE

John A Peake of Surrey Drive, Congleton, Cheshire writes

Q I own a Dragon 32, and a friend of mine who has the same machine damaged it by plugging a Rom Cartridge in with the power switched on. Could you please tell me why this should do damage. Is there an interface that allows one to connect cartridges safely with the computer switched on?

A The problems with the Dragon Cartridges are caused by power surges. It happens almost all of the time but is usually unnoticed. The surge of power usually lasts just a few milliseconds, but can put double or even treble voltage levels through the system. The various chips on board the computer are protected, but adding additional protection to each and every cartridge would be hideously expensive.

As for a mother board of the type you suggest I do not know of one, though it would seem to be a good idea. However the expense for what is really a very minor modification would probably be prohibitive.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke*, *PCW*, 12-13 Little Newport Street, London WC2R 3LD.


NEWS FLASH
TITANIC
29th March 1984

Tony Bridge's Adventure Corner



Snap judgement

Talking of Solarsoft (see last week) reminds me of an adventure from Alligata called *Here comes the Sun* I have to say that I was not taken with this one Although after my experience with Phipp s *Knight s Quest* which only dawned on me some considerable time after he initial, rather off putting, impression, I am wary of making snap judgements on any adventure *Here comes the Sun* is another of those interminable *Wumpus* spin-offs, and at least the first few locations are just spent going round and round trying not to get unceremoniously bumped off However. I must say that the music (such as it is on a Spectrum) is quite well thought out, with a great version of Monty Python's 'I'm a Lumberjack among other oddities!

Some of the humour is rather lavatonal (quite literally so! — this is the first adventure in which you have to look after bodily functions) and the author has taken the trouble to redefine the character set If he had taken similar trouble in catching the spelling and grammer mistakes, and providing an interesting introduction to the whole thing I would have quite enjoyed this one Let me have a hint sheet Alligata, and we ll have another look in a few weeks

Finally Ian closes by saying "I do not mind reviews of games on your page but must you review games like *The Warlock of Firetop Mountain* as this is not a true adventure game But have you gone completely mad — since when has the Korth Trilogy of arcade games been classed as an adventure game entitled to a review on an adventure page?"

Warlock comes as part of a package which also includes the wonderful book by Jackson and Livingstone This is described as "a fighting fantasy" — I m quite happy to include fantasies in the genus adventure although I am aware that *Twofm* is stretching the term, as it is really a zap game! However if people are looking for a text adventure they now know that this program is not for them

Similarly, with the Korth Trilogy, these three packages are described on the sealed covers as Adventures Good though I found the programs they are not adventures! Actually some of the games contained within come close to being good strategy games, and will please younger players — and quite incidentally some of them, too have more merit than many adventure games!

As well as reviewing adventures I must also have a look at programs passing themselves off as adventures, and report on them — after that the reader can make up his own mind

News this week of a couple of new products from Melbourne House Well actually three new products!

The first can be dealt with pretty quickly *Sherlock* will be the eventual follow-up to MH s classic "eventual" because it is say Melbourne House still "in preparation" and will be with us in a few months You can bet that it will be worth the wait!

To keep us happy in the meantime Melbourne House has been working on *Mugsy*, a text and graphic adventure which takes place in Chicago, during the Prohibition days

If all this adventuring has worn you out, you may want to fall back in a chair and read a good book If so, Melbourne House can supply you with a couple of good uns The first has been out for a month or so and comes from Keith Campbell He writes an adventure column in C&VG and his *Book of Adventure* is a good read It covers the history of adventure games and goes on to show how you can write a program, versions of which are given for several popular machines

There s just enough time left this week to tell you of a new adventure that has just come into the office Its author Jack B N Storrock spoke to me over the phone

"The adventure, which is called *Plorafoil* is going to wipe the floor with *The Hobbit* and *Valhalla* In fact if you can imagine a combination of the former s intricate puzzles and the latter s animated graphics you will have an inkling of what it is like to play There is also a fantastic arcade sequence which makes *Manic Miner* look frankly old fashioned!

"The program will be available for machines such as the Spectrum ZX81 IBM PC and CBM 64 as well as the Souffle — sorry Flan — and QL The last two options will give us plenty of time to actually write the versions!

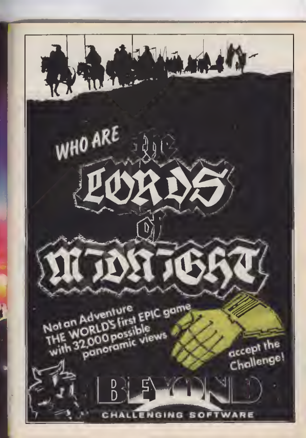
The adventure concerns the exploits of Sir Hubert the Ever Ready in the fabled land of Plorafoil It comes complete with dragons unicorns — in fact the list of monsters is staggering! The unique thing about our adventure is that the player doesn t actually have to do anything — the animation is so good that you can actually sit back and watch everything happen Unlike *Valhalla* no input is required on the part of the player, thus making the adventure fun to play, and easy for experienced and novice player alike *Plorafoil* has to be seen to be believed!"

The new program will be released this weekend Mr Storrock has given the readers of his favourite column a special preview clue to help them on their way Look at Sunday s date and you will find that understanding will hot tle far behind!

This series of articles is designed for novice and experienced Adventurers alike Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter So if you have an Adventure you want reviewed or if you are stuck in an Adventure and cannot progress any further write to Tony Bridge Adventure Corner, *Popular Computing Weekly* 12 13 Little Newport Street, London WC2R 3LD


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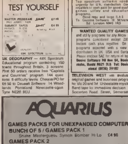
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DRAGON DISK DRIVE, interface Tel Pete, Leicester 890063

48K SPECTRUM wanted Swindon Ave Tel 0793 763247

18th NOVEMBER 1982 issue of Popular Computing Weekly to buy or borrow Tel Leyland (07744) 35648

NELP NEC 8800 owners are there any out there? NEC user group? NEC software wanted Data transfer via radio Contact G8POO contact Dave 19 Ethelbert Sq Westgate on Sea Kent.

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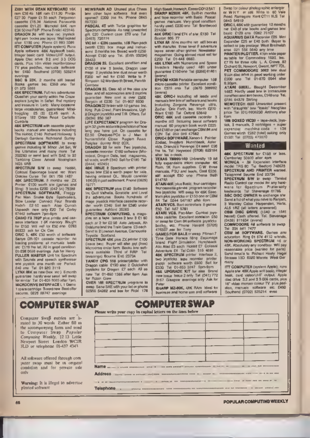
ADVENTURE HELPLINE

Micro *BBC Model B*
Adventure *Snowball*
Problem. *Of what use is the Hospital Gown What do I do with the Linedrives and the Screwdriver How do I get the woman out of the Coffin?*
Name: *Bob Aitken*
Address *42 Lochbrae Court Lochbrae Drive Rutherglen, Glasgow Scotland*

Micro *Commodore 64*
Adventure *The Hobbit*
Problem. *I have numerous keys magic ring but cannot get past either the Bog (ISINK) or the elf clearing I have Thorin with me PS I am playing from a saved game in which I have got to Spiders Web is it possible that bugs could creep in and these have been saved?*
Name *Dr Carl N Martin*
Address *34 The Gallops, York YO2 3NF*

Micro *BBC Model B*
Adventure *Sphinx Adventure (Acornsoft)*
Problem *Having collected various objects (wand carrot etc etc) in stock When I say Wave wand the reply is nothing obvious happens!*
Name *Neil Barnes*
Address *184 South Road Bretherton Preston Lancs PR5 7AH*

Micro *Vic 20*
Adventure *Voodoo Castle (Scott Adams)*
Problem *Can not find stand or camp As in with knife in hand you take a STAND circle the coffin and wave the stick and hold the CAMP" etc etc*
Name *Mr G Rees*
Address *117 Regents Park Road Shirley Southampton, Hants SO1 3NZ*



ZX81 WITH DEAN KEYBOARD 16K ram £38.45 16K ram £11.20 Printer £27.30 Paper £1.35 each Ferguson cassette £15.38 National Panasonic cassette £11.25 Memotel 64K ram £38.50 incl P&P Phone Bristol 423146

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CASIO FX 702P plus printer and cassette interface 1.6K memory Bought for £150 Will sell for £50 ono 0283 66333 ask for Ox Cex

ORIC 1, 48K £30 worth of software Sanyo DR-101 cassette recorder no loading problems all manuals leads etc £119 the lot. All in good condition 01-228 0658 evenings Ask for Henry

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TANDY CPG 115 printer/plotter with Dragon cable £120 also 2 Quickshot joysticks for Dragon £7 each All as new Tel 01-650 1365 after 6pm Ask for Robin Glew

OVER 100 SPECTRUM programs to swap Send SAE with your list or phone 02556 54282 and ask for Ricki 176 High Beech, Harwich, Essex CO12 3AT

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ATARI 400 plus Basic four cartridges four cassette games program recorder two joysticks Will swap for 48K Spectrum plus joysticks or £150 ono or CBM 64 Tel 0244 547187 after 6pm

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ATARI 600XL. Bought December 1983 Hardly used and in immaculate condition and two books, £140 ono Tel. 0786 64379 Stirling

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Wanted

48K SPECTRUM for £150 or less. Camberley 33820 after 4pm

MONICA + 3A Expansion interface model TRS 80 Tel Bedford 740673

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SPECTRUM S/W to swap Tamiya Radio Control car model for any hardware for Spectrum Preferably keyboards Tel Stevenage 61765

BBC DISC OWNER to exchange s/w Send a list of what you have to Ranjam, 3 Wensley Close Harpenden, Herts. AL5 1RZ (all letters answered)

CBM DISC DRIVE (1540 or 1541 based) Cash offered. Tel. Stevenage (0438) 811634 (evens)

COMMODORE 64 software to swap Tel 031 661 7477

CBM 64 SOFTWARE. Games and education Ring 01 674 4112 wanda.

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ITT COMPUTER (system Apple) runs Apple s/w 48K Apple soft basic, integer basic, card video/UHF output. Apple disc drive 3.2 and 3.3 DOS cards, plus 16" video monitor colour TV plus paddles, manuals software etc. £450 Southend (0702) 525214 eves

COMPUTER SWAP

COMPUTER SWAP

Computer Swap entries are limited to 30 words. Either fill in the accompanying form and send to Computer Swap *Popular Computing Weekly*, 12-13 Little Newport Street London WC2R 3LD or telephone 01-437 4343

All software offered through computer swap must be in original condition and for private sale only

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Please write your copy in capital letters on the lines below

Name

Address

Telephone





New Releases

DIG THIS

Pedro, manic gardener, has arrived, simultaneously released for the Dragon, Commodore 64 and Spectrum by Imagine

Pedro is a mexican farmer trying to scratch an honest living from the soil — however, his plants are being decimated by a host of unlikely creatures and a recalcitrant tramp who appears to eat seeds

Pedro must keep planting seeds and use bags of compost and bricks to build a wall to keep out the pests The view is a kind of edge-on diagonal of the garden — three dimensional if you stretch credibility a bit

The graphics are reasonable and the game itself is very addictive — expect to see this one in more than one chart pretty soon

Program *Pedro*
Price *£5 50*
Micro *Spectrum/Dragon/ CBM 64*
Supplier *Imagine Software*
5 Sir Thomas Street
Liverpool
Merseyside L16 BW

BOWLED OVER

Alley Oops is an arcade game for the Commodore 64 which is only vaguely to do with bowling and bowling alleys

Although the game does feature a bowler and bowling balls, the real skill of the game involves avoiding various obstacles — especially nasty gum spots that will stick both you and the ball to the floor

True to arcade convention there are several screens of increasingly difficult action — the eighth level is supposed to be close to impossible

Program *Alley Oops*
Price *£7 99*
Micro *Commodore 64*
Supplier *Aliren software*
1000a Uxbridge Road
Hayes
Middlesex

FIREBALLS

Cuthbert in the Mines is the latest in Microdeal's *Cuthbert* saga Most of the other *Cuthbert* games were very good although I can't help finding the attempt to build *Cuthbert* up as a sort of *Horace* rival a bit contrived

Here, the game is basically of the run up and down ladders avoiding obstacles genre as you try to avoid trucks, fireballs and demons and guide *Cuthbert* out of a mine (someone has left him there and I don't blame them)

However, fair's fair, Microdeal are almost the only company that have consistently issued good quality machine code arcade games for the Dragon and a lot of Dragon owners should find this well up to the usual standard

Program *Cuthbert in the Mines*
Price *£8 00*
Micro *Dragon 32*
Supplier *Microdeal*
41 Truro Road
St Austell
Cornwall
PL25 5JE

MASOCHISM

Epic Software has strong support among adventurers of the "well even though we've tried three hundred different ways to solve this problem we can't let it beat us school of masochism

One secret to a convincing text adventure is a flexible response to the players input Epic's latest adventure is *Wheel of Fortune* and it can accept sentences like "Take the biscuits and eat them but don't eat the cakes or drink the tea" and make sense of them

There are teletext graphics to illustrate each of the 250 locations and the function keys can be programmed with commonly used sentences and phrases like 'help' and 'kill vicious tharg with trowel'

The plot involves a magical *Wheel of Fortune* which transports you to a bizarre world of the future — the difficulty is getting back

Program *Wheel of Fortune*
Price *£9 95*
Micro *BBC B/Electron (no graphics)*
Supplier *Epic Software*
10 Gladstone St
Kibworth Beauchamp
Leicester
2EB 0HL

TOUGH GOING

Acornsoft's Adventures are probably the most successful programs it has released People still mutter darkly about the problems to be found in *Philosopher's Quest* and *Sphinx Adventure*

Good news for adventure fans — Acornsoft have just released a new adventure *Kingdom of Hamil* It's impossible to do justice to any adventure in a small space like this, but drawing conclusions from the enclosed book of hints and answers I would say that this one is pretty tough although all the solutions are reasonable, in retrospect anyway

Other than that, it is a standard text adventure accepting the usual two word instructions — unsophisticated but functional

Program *Kingdom of Hamil*
Price *£9 95*
Micro *BBC B*
Supplier *Acornsoft*
4a Market Hill
Cambridge
CB2 3NJ

PUB CRAWL

Whilst there are many who would agree that getting back from the pub after a night out is often a hazardous experience, few would have dreamt the ramifications to be found in *Pub Quest* by Dream Software

Getting home, after losing your money in the gutter, is the simple objective of this real time text adventure

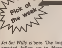
The settings may not be as glamourous as in conventional adventure games — you are more likely to die from being run over by the traffic whilst in an alcoholic stupor than burnt by a mighty fire-breathing Dragon — but solving the adventure is every bit as tough

Program *Pub Quest*
Price *£5 95*
Micro *Commodore 64*
Supplier *Dream Software*
PO Box 64
Basingstoke
RG21 2LB

QUIZ TIME

Test Yourself is a range of modular design educational programs for the Spectrum Using the system, the programs designers Dauck aim to





Jet Set Willy is here The long awaited follow up to *Manic Miner* has taken ages but it's certainly worth the wait — I think it's quite possibly even better than the original!

BETTER THAN THE ORIGINAL

With a success like *Miner* the temptation to do exactly the same again must have been strong and, indeed, why radically alter a winning formula

In terms of 'plus ça change plus c'est la même chose' I think the balance in *Jet Set* is about right Controls are left, right, jump and the various screens contain the usual bizarre animals, people, weird inanimate objects and other horrors

Different elements include the much wider variety of screen layouts, the chance to go through the rooms in more or less any order and special obstacles like swinging ropes It's technically brilliant, funny and of course, completely addictive Work halted for several hours in the office when it arrived

Two points of random interest — the music which plays continuously through the game is *If I were a rich man* and in one of the rooms Willy turns into a flying pig for no apparent reason Is this deliberate or not? I think we should be told

Incidently, did anyone see *Saturday Superstore* recently in which *Manic Miner* was criticised for its continuous sound? — I think someone should have told them you can switch the sound off

Program *Jet Set Willy*
Price *£5 95*
Micro *Spectrum*
Supplier *Software Projects*
Bear Brand Complex
Allerton
Woolton
Merseyside

produce tapes to test everything from 'O' level physics to road signs

The master program organises the data on the various subject modules The questions can be asked either against the clock, worked out with the answers, or as a test with no time limit Scores can be kept and mistakes analysed

The master program also comes with a utility to help you compose your own questions and a free physics 'O' level data tape

Program *Test Yourself*
Price *£7 95*
Micro *Spectrum 48K*
Supplier *Dotek computing*
133 Chiswick Village
London W4 3DQ

STAR-GAZING

Constellation is a neat program from Superior Software which lets you view the stars in the comfort of your own living room — or wherever you keep your micro

The screen becomes an imaginary telescope that can be used to view up to 50 constellations — a total of 455 stars

You can move up down, left or right and zoom in and out of the picture Stars can be displayed by magnitude or constellation The program is one of a batch of new releases for the new Acorn machine issued by the company

Program *Constellation*
Price *£7 95*
Micro *Electron*
Supplier *Superior Software*
Dept EV4 Regent House
Skinner Lane
Leeds 7

DUELLING

Sword Master is a duelling simulation for the Acorn Electron in which you control a knight engaged in combat with another

The graphics are well done, being both slickly animated and suitably medieval As you become more adept with the sword so your knight ascends through the ranks from greenhorn to Sword-master

Your strength in the fight is represented by another knight whose sword gradually sags

Another neat touch is a high score table which can be saved to tape so that particularly stirring performances can be retained to impress your friends

Program *Sword Master*
Price *£7 95*
Micro *Electron*
Supplier *Micrograf*
120 Oxford Road
Reading
Berkshire
RG1 7NL

MOONSCAPE

A couple of years ago, everybody's favourite arcade game from a quality of graphics point of view was *Moon Buggy*, where you had to move a rover over increasingly difficult terrain, fighting off baddies and avoiding bumps and dips as you went

Rabbit Software have now brought out a fairly accurate version of the original for the Commodore 64 The graphics are every bit as good as the original, even down to the tyres which bounce off whenever disaster strikes It's cheap for a Commodore 64 game too

Program *Troopatruck*
Price *£5 99*
Micro *Commodore 64*
Supplier *Rabbit Software*
The Warren (Unit 11)
Forward Drive
Wealdstone
Middlesex
HA3 8NU

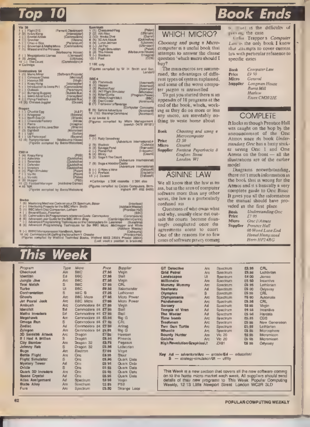
VIRAL LOGIC

Fans of The *Andromeda Strain* may find the subject matter of *Molecule* intriguing Like the scientists in that film, you have to discover the structure of a dangerous virus

In essence, the program is a puzzle involving logic — you must discover the structure from various diverse pieces of evidence Presumably, the game mimics some actual reasoning involved in such analysis — it was written by a research scientist If you enjoy puzzles, it's very addictive

Program *Molecule*
Price *£6 90*
Micro *BBC B*
Supplier *Bridge Software*
36 Fernwood
Marple Bridge
Stockport
Cheshire SK6 5BE

New Releases is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases, Popular Computing Weekly, 12-13 Little Newport Street, WC2R 3LD



Top 10

Vic 20
1 (-) Flight 015 (Ferranti Davenport)
2 (2) Krazy Kong (Interceptor)
3 (-) Emmet Attack (Commodore)
4 (-) Snooker (Visions)
5 (-) Choo-o-Bite (Paramount)
6 (-) Snowman & Maths Maze (Commodore)
7 (1) Wizard and the Princess (Melbourne House)
8 (-) Megagalactic Llamas (Llamasoft)
9 (8) Jetpac (Ultimate)
10 (-) The Count (Commodore)*
* Cartridge

Commodore 64
1 (1) Manic Miner (Software Projects)
2 (-) Colossus Chess (Microsoft)
3 (-) [illegible] (Virgin)
4 (-) Krazy Kong (Interceptor)
5 (-) Introduction to Basic Pt 1 (Commodore)
6 (-) Outback (Paramount)
7 (-) Bumping Buggies (Bubble Bus)
8 (-) Ixens Adventure 2 (Honeyfold)
9 (-) Flying Feathers (Bubble Bus)
10 (5) Chinese Juggler (Ocean)

Dragon
1 (-) Chuckie Egg (A&F)
2 (-) Kriegspiel (Beyond)
3 (-) North Sea Oil (Shards)
4 (-) Chocolate Factory (Mintex)
5 (-) Pedro (Imagine)
6 (-) Mystery of the Java Star (Shards)
7 (3) Eightball (Microdeal)
8 (-) Ugh! (Softek)
9 (-) Up Periscope! (Beyond)
10 (8) Hungry Horace (Melbourne House)
(Figures compiled by Boots/Websters)

ZX81 *
1 (4) Krazy Kong (PSS)
2 (-) Asteroids (Quicksilva)
3 (-) Scramble (Quicksilva)
4 (-) Defender (Quicksilva)
5 (-) Invaders (Quicksilva)
6 (1) Flight Simulator (Psion)
7 (-) Vu-file (Psion)
8 (-) Vu-calc (Psion)
9 (5) Hopper (PSS)
10 (2) Football Manager (Addictive Games)
* All 16K
(Figures compiled by Boots/Websters)

Spectrum
1 (1) Chequered Flag (Psion)
2 (2) Atic Atac (Ultimate)
3 (10) Scuba Dive (Durell)
4 (6) 3D Ant Attack (Quicksilva)
5 (4) Lunar Jetman (Ultimate)
6 (-) Jet Pac (Ultimate)†
7 (3) Flight Simulation (Psion)
8 (8) The Hobbit (Melbourne House)
9 (-) Stonkers (Imagine)
10 (-) Pool (CDS)
† 16K only
(Figures compiled by W H Smith and Son, London)

BBC *
1 (2) Planetoids (Acornsoft)
2 (1) Hopper (Acornsoft)
3 (3) Rocket Raid (Acornsoft)
4 (6) 747 Flight Simulator (Microdeal)
5 (4) Killer Gorilla (Program Power)
6 (8) White Knight Mk II (BBC)
7 (9) Dec Doster (Acornsoft)
8 (7) Transistor's Revenge (Computer Concepts)
9 (6) Sphinx Adventure (Acornsoft)
10 (10) Starship Command (Acornsoft)
* All Model B
(Figures compiled by Micro Management, Ipswich 0473 59181)

Atari
1 (1) Rally Speedway (Adventure International)*
2 (3) Warlock (Calisto)‡
3 (2) Savage Pond (Starcade)
4 (-) Planet Fall (Infocom)†
5 (4) Slinky (Cosmi)
6 (5) Saga 5 The Count (Adventure International)
7 (9) Saga 4 Voodoo Castle (Adventure International)
8 (-) O'Riley's Mine (Datasoft)
9 (-) Firefleet (English)‡
10 (-) Zaxxon (Datasoft)
*Cartridge ‡ 32K cassette † 32K disc
(Figures compiled by Calisto Computers, Birmingham 021 632 6458)

Books
1 (5) Mastering Machine Code on your ZX Spectrum, *Baker* (Interface)
2 (-) Interfacing Projects for the BBC Micro, *Smith* (Addison Wesley)
3 (1) BBC Micro Disc Companion, *Latham* (Prentice-Hall)
4 (-) Beyond Basic, *Freeman* (BBC)
5 (2) Commodore 64 Programmers reference Guide, *Commodore* (Commodore)
6 (6) Advanced user Guide for the BBC Micro, *Bray* (Cambridge Micro Centre)
7 (-) Advanced Programming Techniques on the Commodore 64, *Lawrence* (Sunshine)
8 (8) Advanced Programming Techniques for the BBC Micro, *McGregor and White* (Addison Wesley)
9 (-) 68000 Microprocessor Handbook, *Isaacs* (Osborne)
10 (4) Commodore 64 Getting the Most from It, *Onosko* (Prentice Hall)
(Figures compiled by Watford Technical Books, Watford 0923 38924 Prestel 38644)
(Last week's position in brackets)

Book Ends

WHICH MICRO?

Choosing and using a Microcomputer is a useful book that attempts to answer the classic question 'which micro should I buy?'

The main micros are summarised, the advantages of different types of system explained, and some of the worst computer jargon is unravelled

To get you started there is an appendix of 18 programs at the end of the book, which, working as they do on more or less any micro, are inevitably nothing to write home about

Book *Choosing and using a Microcomputer*
Price *£2 50*
Micro *General*
Supplier *Fontana Paperbacks 8 Grafton Street London W1*

ASININE LAW

We all know that the law is an ass, but in the area of computer software more than any other areas, the law is a particularly confused ass

Questions of who owns what and why, usually clear cut outside the courts become dauntingly complicated once disagreements come to court. One of the reasons for so few cases of software piracy coming to [illegible] is the difficulty of proving the case

[illegible]lin Trapper's *Computer Law* is the only book I know that attempts to cover current law with particular reference to specific cases

Book *Computer Law*
Price *£9 50*
Micro *General*
Supplier *Longman House Burnt Mill Harlow Essex CM20 2JE*

COMPLETE

It looks as though Prentice Hall was caught on the hop by the announcement of the Oric Atmos since its book *Understanding Oric* has a hasty sticker saying Oric 1 and Oric Atmos on the front — all the illustrations are of the earlier model

Diagrams notwithstanding, there isn't much information in the book that is wrong for the Atmos and it's basically a very complete guide to Oric Basic. It gives you all the information the manual should have provided in the first place

Book *Understanding Oric*
Price *£7 95*
Micro *Oric 1/Atmos*
Supplier *Prentice Hall 66 Wood Lane End Hemel Hempstead Herts HP2 4RG*

This Week

Program	Type	Micro	Price	Supplier
Checkout	Arc	BBC	£7.95	Virgin
Identifit	Ed	BBC	£7.95	Stell
Jungle Jive	Arc	BBC	£7.95	Virgin
Test Match	S	BBC	£7.95	CRL
Turbo	Ut	BBC	£9.95	Salamander
Confrontation	S	BBC B	£7.95	Lothlorien
Ghouls	Arc	BBC Micro	£7.95	Micro Power
Jet Power Jack	Arc	BBC Micro	£7.95	Micro Power
Ambush	Arc	Commodore 64	£7.95	Virgin
Identikit	Ed	Commodore 64	£7.95	Stell
Maths Invaders	Ed	Commodore 64	£7.95	Stell
Megahawk	Arc	Commodore 64	£8.95	Big G
Omega Run	S	Commodore 64	£7.95	CRL
Zodiac	Ad	Commodore 64	£7.95	Anirog
Zylogon	Arc	Commodore 64	£6.95	Big G
3D Seiddab Attack	Arc	Dragon	£7.95	Hewson
If I Had A Million	S	Dragon	£8.95	Phoenix
City Bomber	Arc	Dragon 32	£3.75	Pegasus
Johnny Reb	S	Dragon 32	£6.95	Lothlorien
Bugs	Arc	Electron	£7.95	Virgin
Battle Flight	Arc	Oric	£6.95	Stoor
Flight Simulator	S	Oric	£6.95	Quark Data
Mystery Tower	Ad	Oric	£6.95	Quark Data
Oricle	S	Oric	£6.95	Quark Data
Quark 3D Invaders	Arc	Oric	£6.95	Quark Data
Space Crystal	Ad	Oric	£6.95	Quark Data
Atlas Assignment	Ad	Spectrum	£6.95	Virgin
Blade Alley	Arc	Spectrum	£5.95	PSS
Fura	Arc	Spectrum	£5.50	Strange Loop
GT Detective	Arc	Spectrum	£5.95	CRL
Grid Patrol	Arc	Spectrum	£5.95	Lothlorien
Landscapes	Ut	Spectrum	£4 00	James
Millionaire	Arc	Spectrum	£5 50	Incentive
Mummy Mummy	Arc	Spectrum	£6 95	Lothlorien
Nosferatu	Ad	Spectrum	£6 00	Odyssey
Olympics	S	Spectrum	£6 95	CRL
Olympimania	Arc	Spectrum	£6 90	Automata
Pandemonia	Arc	Spectrum	£5.95	CRL
Sorcery	Ad	Spectrum	£6 95	Virgin
Temple of Vran	Ad	Spectrum	£5 55	Incentive
The Waster	Ad	Spectrum	£5 50	Hardala
Time bomb	Arc	Spectrum	£5.95	CDS
Trashman	Arc	Spectrum	£5 95	New Generation
Two Gun Turtle	Arc	Spectrum	£5 95	Lothlorien
Wheelie	Arc	Spectrum	£5 95	Microsphere
Bounty Hunter	Arc	Vic 20	£6 95	Micromloon
Gatcha	Arc	Vic 20	£5 95	Micromloon
High Revolution Graphics	Ut	ZX81	£6 95	Odyssey

Key Ad — adventure/Arc — arcade/Ed — educational/ S — strategy-simulation/Ut — utility

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to This Week, Popular Computing Weekly, 12 13 Little Newport Street London WC2R 3LD



Video nasties

The latest half baked idea to come out of the House of Commons is the inclusion of video games in the censorship system set up by the Video Recordings Bill

The Bill — sometimes called the Bright Bill, after Greham Bright the MP who put it forward — means that just like cinema films videos will have to have a certificate from a board of censors before they can be hired out or sold Videos will be graded — U PG 15 18 and 18R (the R means they can only be supplied by sex shops) and you won t be able to buy or hire for example an 18 graded video if you are under 18 The idea is to stop children buying unsuitable films — video nasties — and to give their parents some idea of what they are watching

Originally all video games were completely excluded from the Bill But now MPs have decided the only video games excluded will be those which didn t show stimulate or encourage sexual or grossly violent acts MPs were apparently swayed by a campaign which the *Sun* newspaper has been running to get Harrods to stop selling Artic s *Ship of Doom* which recognises and responds to the idea of a sexual act or attack They were also influenced by advertisements for softporn adventure games in the Maplin Guide to Electronic Components and Home Computers

But they clearly haven t thought it through The Bill will result in a lot of uncertainties and absurdities for the computer games industry How could a censor be certain of finding all the possible options in an adventure game? What games will need certificates — a software house will have to decide whether it needs to go to the time trouble and expense of getting a certificate or risk a possible stiff fine Many games on the market could in a sense be said to encourage gross violence — after all what could be more horrifically violent than a game like Red Shift s *Apocalypse*, based on nuclear war? And the infamous *Bomb Buenos Aires* by Llamasoft? Or DkTronics *Who dares wins* where the player has to shoot the terrorists rather than the hostages as they appear at the window? Will they need a certificate?

Moreover you could have a crazy situation where the video game of *Apocalypse* needed a certificate — and was possibly restricted to those over a certain age — yet the board version would neither need one nor be restricted And there would appear to be nothing to stop a magazine printing listings of the game

I intensely dislike the zap and pow approach of many computer games with their mindlessly violent themes I hate the way the games are almost all aimed at boys not girls and the females who do occasionally crop up, are just there to be weak feeble and rescued The more explicitly violent or sexual games stem directly from these attitudes But the attitudes won t be attacked by this Bill *Donkey Kong* will reign undisturbed.

Censorship systems too easily reflect the prejudices of the censors If censorship were really likely to result in healthier attitudes I might welcome it But it won t And the danger is that the structure would be there for the Government to use to influence the kind of films we see and the games we play And governments can be very partisan and selective in the kinds of things they don t like The BBC isn t government controlled but look at the way the anti nuclear film *The War Game* has never been shown Could anti nuclear games like *Base Invaders* be too topical for the Government s comfort?

No one will know until the system is actually in operation And by then it will be too late As old Chinese proverb says He who ride tiger cannot dismount

Gail Counsell

Line for line

Puzzle No 100

I called in at the local shop to buy a new colour television

"And a very wise choice sir!" exclaimed the salesman "One of our most popular lines "

"*625 lines* I hope " I remarked making a joke that didn t come off

"You might well laugh " replies the salesman grimacing "but I happen to know that the company has sold exactly £1 111 111s worth of these televisions "

Mazing init?"

As I knew how much I had paid for the television — which was an exact number of pounds — I was able to work out the number of tvs sold

But can you?

Solution to Puzzle No 95

There is only one arrangement of all 9 digits — in ascending order 123456789 but this is not a perfect square so the answer must have eight digits or less Thus only the squares of numbers from 4 to 4843 need be tested

```
10 FOR N 4 TO 4843 20 LET I - N N 30 LET Is
STRs I 40 FOR F 1 TO LEN Is 1 50 IF Is(F) >
Is(F 1) THEN GOTO 80 60 NEXT F 70 PRINT N Is 80
NEXT N
```

The largest possible square with digits in ascending order is 134689 — the square of 367 Apart from 134689 and the squares listed in the original question (16 25 36 49 169 256,289) the only other squares with this property are 13456 (116^2) and 13689 (117^2)

Winner of Puzzle No 95

The winner is Larry Wilkinson Queen s Drive Sedgefield Stockton on-Tees Cleveland who receives £10

but seriously **AUTOMATA**

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ZOT!

KASWOOOOOSHH

HOWEVER HERE IN PI LAND THE MOST EXCITING THING IS WATCHING PIMAN ATTEMPT THE PI-JUMP

LOOK AT HIM GO!

PFAT PFAT PFAT PFAT

PFAT PFAT PFAT

HUP!

SPLANG

OUG!

THFLUB

UUUUNHH

KLONGA

ERK!

PIRAMEDICS!!

WHAT HAPPENED?

HE WAS ATTEMPTING THE PI-JUMP BUT HE BANGED THE TOP OF HIS HEAD ON THE BOTTOM OF THE BAR – THEN HE LANDED ON THE GROUND AND THE BAR LANDED ON HIM

PIMAN SAY SOMETHING!

ALL RIGHT THEN – REAL ALE!

GIVE IM A SHOT SID!

WAH WAH WAH

HOSPITAL

OH! DON'T MIND IF I DO, IF YOU'RE PAYING

POOR LITTLE PERISHER! IT LOOKS AS THOUGH HE MAY BE LAID UP FOR A TIME – BUT DON'T YOU LOT FORGET MOTHERS' DAY THIS COMING WEEKEND – THAT'S RIGHT, APRIL 1ST – BUT NO INK SQUIRT FLOWERS OR ONION CHOCS –

YEAH, HAVE A SWELL DAY ALL YOU MOMS – EVEN THE ONE WHO THINKS THE BACK PAGE IS DIRTY!

MOTHER...

DON'T BE SILLY YOU WERE CONCEIVED IN A PINT MUG

HOW WOULD YOU LIKE A PI MONTHLY CARTOON NEWSLETTER, 20% OFF ALL OF THE PIMAN'S GAMES, T SHIRTS, RECORDS AND PI-PRODUCTS DIRECT FROM AUTOMATA, ADVANCE NEWS OF PIMAN'S PLANS, AN OFFICIAL LOONY PIMANIAC CERTIFICATE? VERY MUCH? THEN WHY NOT:

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